AMERICAN BEE JOURNAL

DECEMBER
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Vol. 93, No. 12 December, 1953

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Insect Pollination of Ladino Clover in South Carolina[1]

by David Dunavan[2]

THE extensive use of Ladino clover in the southern states has turned the attention of beekeepers to this plant which is a comparative newcomer in this area.

In 1949 there were in South Carolina, 16,057 acres of Ladino clover grown for seed production. However, the acreage grown for seed production represents only a small fraction of the total acreage of this crop in the state. In 1951 the total acreage of Ladino clover grown in permanent winter pastures in South Carolina was 319,723 acres. Of this 69,679 acres were harvested for commercial seed production.

The status of this clover as a source of surplus honey in South Carolina is not yet fully established, but in some areas good yields have been quite definitely attributed to it. Apparently wherever it is grown in the state it is actively worked by honey bees for both nectar and pollen. This is, of course, of utmost importance to the growers of the crop.

The emphasis on seed production largely justified the investigation reported herewith. However, there is considerable evidence that high seed set under pasture conditions is essential for perpetuation of this legume in pastures in the South. The work was carried on at the South Carolina Agricultural Experiment Station at Clemson. This is in the Piedmont area of the state in which about half of the Ladino clover of the state is grown. The objective was to answer two questions:

(1) What insects are responsible for pollination of Ladino clover?

(2) To what extent are honey bees responsible for this pollination?

Plots were located in an established pasture consisting of a good stand of Ladino clover and Kentucky 31 Fescue. The following plot treatments were provided for:

A. Pollinating insects excluded by screen, two plots.

B. Honey bees only, two plots.

C. Open pollination, two plots.

The last mentioned plots in reality were not treated in any way, but were simply staked off so that their location was known throughout the investigation. Screen cages about 4 by 4 feet and 3 feet high made of 16-mesh bronze screen were used to exclude pollinating insects and/or to confine the honey bees.

Each cage, in which only honey bees were allowed, had a hive of bees placed against one side. The hive had one entrance opening into the cage and another arranged for free flight outside. (See Fig. 1). For the first few days small numbers of bees failed to find their way into the hive from the interior of the cage and had to be shaken out for a fresh start. Very soon, however,

1. This is a condensation of a paper originally published in its entirety as Technical Contribution No. 185 from the South Carolina Experiment Station, in the Journal of Economic Entomology, Vol. 45: 124-125, Feb. 1952.

2. Associate Entomologist, South Carolina Experiment Station, Clemson, South Carolina.

Fig. 1—Cages and hives of bees for Ladino clover pollination studies.

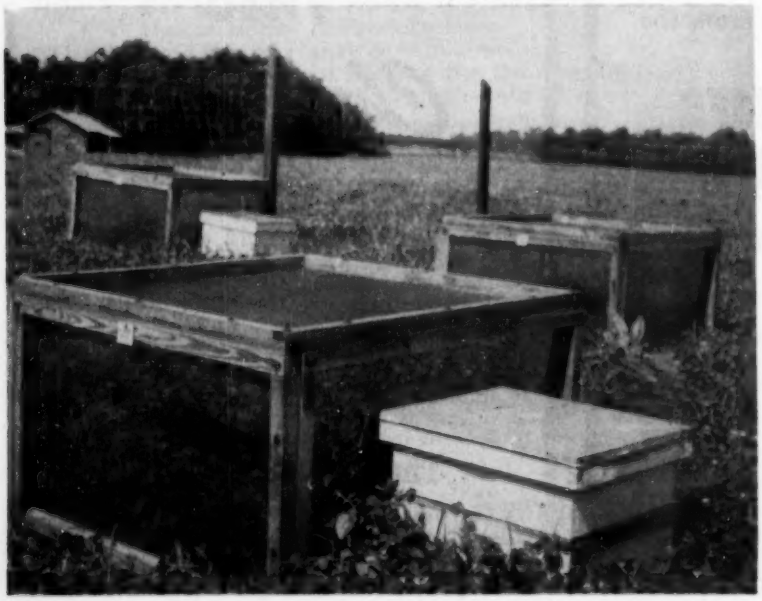
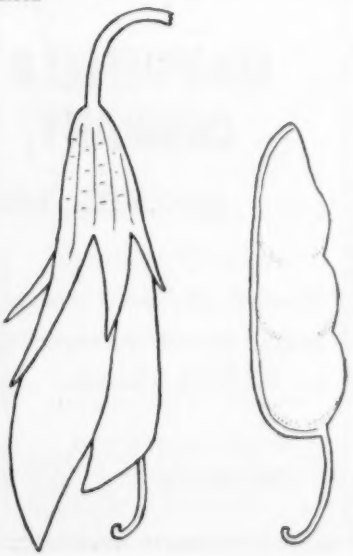


Fig. 2—A (left) Ripe Ladino clover floret; B (right). Seed pod removed from floret.



the bees were observed to work freely on blossoms inside the cage and later to re-enter the hive.

In early August when the investigation was terminated all heads from each plot were harvested. A sample consisting of 50 representative heads was taken from each plot in order to make seed counts. The results were somewhat surprising. (See Table 1).

The 50-head samples indicate more seed on the plots visited by honey bees only. On the other hand, total seed produced by each plot shows more seed for the uncaged plots which were available to all insects. It is possible that the reduced light in the caged plots may have cut down seed production. The important fact is that when no insects were allowed to visit the blossoms there was practically no seed production. In areas where wild bees and other natural pollinizers are scarce the conclusion is obvious. The above data are comparative only and represent only the seed production of the areas involved from late June to early August.

Table 1.—Pollination results, Ladino clover at Clemson, S. C.

	No Insect Pollinizers	Open Pollination	Honey Bees Only
Seed from 50 heads	136	3,632	4,493
Ave. seed per head	2.72	72.64	89.87
Total seed from plots	272	21,568	16,728
*Estimated pounds per acre		24.55	19.04

*These estimated yields cover only a fraction of the season (June 28 to early August) 1950.

Table 2.—Seed Counts of 25 Ladino Clover Heads Showing Distribution of Seed per Floret.*

Head Number	Seed per Floret None	One	Two	Three	Four	Five	Six	Seven	Total Florets	Total No. Seed per Head
1	34	10	23	30	8	1	0	0	106	183
2	5	16	63	41	10	0	0	0	135	303
3	12	21	40	26	10	3	0	0	112	234
4	11	36	28	23	6	0	0	0	104	185
5	3	1	16	24	15	2	0	0	61	175
6	2	3	5	22	39	13	3	0	87	318
7	11	25	26	11	11	6	3	0	93	202
8	3	2	21	37	17	2	1	0	83	239
9	2	7	14	24	19	5	0	0	71	208
10	11	55	44	15	3	0	0	0	128	200
11	7	6	12	37	25	0	1	0	88	247
12	14	10	28	32	10	0	0	0	94	202
13	5	5	13	17	23	1	0	0	64	179
14	1	0	2	9	26	14	3	0	55	223
15	3	7	13	20	20	12	4	0	79	257
16	13	14	28	34	14	1	0	0	104	243
17	13	11	26	25	7	2	0	0	84	176
18	2	1	5	25	40	0	0	0	73	246
19	21	16	12	8	2	0	0	0	59	72
20	15	7	13	32	14	5	0	0	86	210
21	5	6	14	34	20	15	0	0	94	291
22	15	13	21	28	12	7	0	0	96	222
23	1	6	27	25	9	2	0	0	70	181
24	9	3	16	27	17	15	1	2	90	279
25	23	7	16	20	4	0	0	0	70	115
Totals	241	288	526	626	381	106	16	2	2,186	5,390
Averages									84.4	215.6

*It was originally planned to count the seed in all florets of at least 100 clover heads, but the magnitude of the task proved to be appalling.

A brief description of the make-up of the ripe Ladino clover head may be in order here. As is true with all clovers of the genus **Trifolium,** (White Dutch, Alsike, etc.) the head is made up of many florets, each of which somewhat resembles a pea blossom in miniature. (See Figure 2A). In the mature head, each floret, as it is pollinated, turns brown and changes from its original erect position to hang downward. Inside of this ripe floret is found a small pod with a variable number of seeds enclosed. (See Figure 2B).

After the close of the 1950 season, a need was felt for specific data on seed production per clover head, number of florets per head, and number of seed per floret. Accordingly in July 1951 ripe heads were picked at random in the pasture for this study.

Table 2 represents a count made with the aid of a microscope of all the seed in 25 ripe heads. As the counts were being made, the number of seed produced by each individual floret was recorded. (See Table 2).

(Continued on page 487)

A Fine Bee Book By Ribbands . . .

Coming from the Bee Research Press in England is one of the most enjoyable as well as most to be desired bee books that it has been our pleasure to read and review. It is the book by C. R. Ribbands, principal scientific officer of the bee department at the Rothamsted Experimental Station, and has for its title "THE BEHAVIOR AND SOCIAL LIFE OF HONEYBEES." The book is cloth bound, 352 pages with 9 fine plates of photographs and 66 other illustrations.

Mr. Ribbands states that compilation of the book was in part prompted by the work of Von Frisch, and that it is a review of the literature from which the book gets its title. However, this but weakly denotes the effort made by the author in the writing of this book. As an instance, the bibliography embodies the titles of more than 700 printed papers with in excess of 350 writers quoted, from Aristotle to Phillips and from Brother Adam to Zoubarev.

However, we feel that Mr. Ribbands is overly modest in stating that his book is a compilation of material from these varied sources. It is as well quite generously interspersed with original work by this author and his contemporaries at Rothamsted; for instance his studies on the recognition among honeybees of companions and enemies, his conclusions of the correctness of Demuth's observations that congestion is a major cause of swarming. He also describes his experiments to show that selection of source of nectar by the bees is both by choice and by memory, and that in keen competition an individual honeybee will restrict herself to smaller foraging area than when no competition is present.

Ribbands presents, naturally both views on any one subject and often infers his own conclusions where any doubt exists.

We wish to give only one example of how a subject which might be treated as "too scientific" by the layman, becomes not only pleasant reading but highly instructive to the reader. This one refers to time perception by honeybees and gives the observations of Forel who observed bees congregating at his table on an open porch to partake of preserves located there. So time conscious did

(Continued on page 489)

The Language of Bees and Its Practical Application - Part II

by Dr. E. E. Leppik

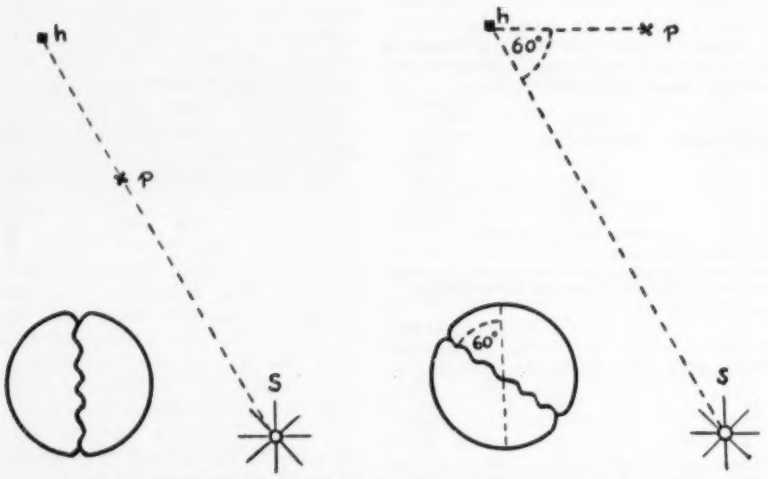


Fig. 3—Diagram to show how the dancing gyrations indicate the direction of the nectar plant with respect to the sun's position. H, the hive; p, nectar plant; s, sun. (According to K. von Frisch).

Classification of Bees' "Dances"

All dances mentioned above indicate the direction and distance of the nectar plants and can be called therefore **"orientation dances"** ("Werbetanzen" of Karl von Frisch). Besides this, several further types of "dances" have been observed recently which seem to serve quite different purposes.

In Switzerland, P. Tschumi observed bees changing their dancing gyrations in accordance with the different directions and distances at which the nectar plants were placed around the hive. (fig. 4:4-6). Nectar plants close to the hive were indicated by round dances, without any special reference to the direction (fig. 4:4). Where the plant was not clearly in sight, bees pointed with the nectar plant (fig. 4:5). If the distance was increased to 50 meters the bees combined the directional sickle dance with a few waggle movements, and if to over 100 meters, with a typical waggle dance (fig. 4:7-8).

These observations and experiments of Dr. F. Baltzer and P. Tschumi prove most convincingly the common **origin of all orientation dances from a simple round gyration** (fig. 4:4-6). The further development of round dances through sickle dances to the most specialized waggle dance is demonstrated in fig. 4:7-9.

Quite different types of "alarm dances" have been observed by F. a sickle dance in the direction of Schneider in connection with the use of nerve poisons. In this case the fast running bees performed different types of "winding" and "staggering" and "trembling" movements (fig. 2). A "staggering" bee performed several types of movements, one after another, pulling his fellow bees with his head and antennae and giving an impression of great excitement.

The **"spiral"** and **"zigzag"** dances of F. Schneider seem to be identical with our "winding" and "staggering" movements of alarmed bees. **Hein** reported recently from the Netherlands a "rucktanz," the zigzag movements of which have a great similarity with our staggering movements (fig. 4:3).

In connection with several other social activities some further types of dances have been observed by K. von **Frisch** ("Zittertanz"), **Haydak** and **Milum** (grooming and shake dances) and **Linduer.** The origins and classification of these dances require further study.

A thorough study of all experiments and observations made by several students in different countries leads to the conclusion that there are two main types of "true" bee "dances," each of which serves a quite different purpose, as follows:

The collecting of nectar and pollen is one of the most important tasks of every beehive, and the orientation dances make excellent cooperation possible between workers whose numbers sometimes exceed 40,000 individuals in a colony. The round dance is the simplest and evidently the oldest in its group. Sickle and waggle dances are specialized but can be derived from the round dance (fig. 4:4-6).

The protection of the community against enemies, epidemics, and poisonous substances is the next important task of a colony. The performance of "warnings" and "alarms" can provoke the whole colony to common and resolute action in the case of approaching danger.

Winding is combined with fast abdominal movements and serves evidently to point to the special danger. All specialized alarm dances can be derived from staggering movements. The staggering dance may be considered therefore the oldest and most generalized, which evidently gave rise to several specialized warning, and alarm dances.

All the bee "dances" known at present may be classified in accordance with this short review and

Orientation of the nectar plants	Alarms and warnings of approaching danger
round dance	staggering
↓	↓
sickle	winding
↓	↓
waggle or tail-wagging dances	warning and alarm dances

personal view of Dr. K. von Frisch as follows:

A. **Orientation dances** ("Werbetanzen" of K. von Frisch). **Round** and **waggle** dances. In some articles also called figure eight dance and apian can-can. Their performance in a beehive directs the workers to a specific nectar plant in a definite place (fig. 5). The **sickle** dance of Baltzer and Tschumi can be derived from round dances.

B. **Alarm and warning dances, "staggering," "winding"** and **"trembling"** of E. Leppik; spiral, zigzag, and stop dances of F. Schneider; "Rucktanz" of Hein. "Stop dances" however, are not confirmed by K. v. Frisch. "Zittertanz" is observed by von Frisch (1923), **Lindauer** (1948), Leppik and Palm (1950) and several others, but need further study. According to the newest information obtained from K. von Frisch, "Zittertänze" should be separated from the group of alarm dances.

C. **Swarm dances** before and during swarming are orientation dances which serve a special purpose. K. von Frisch joins swarm dances with his "Werbetanzen." Swarm dances are studied recently by M. Lindauer (1951).

D. **Shake and grooming dances** of Haydak and Milum. "Putztanz" of K. von Frisch.

E. Whether or not the performances presented by **nuptual flight** by queens can be considered as "dances" is not yet established.

This classification of bee's dances is a preliminary one, and must be accomplished as soon as further study reveals further facts about bee behavior.

Practical Application in Apiculture

By mastering the "language" of bees, any beekeeper is enabled to understand better the very delicate life and work of these most "intelligent" and industrious insects upon whom his complete income depends. Observing the bees' dances, the beekeeper may keep a record of which kind of nectar is deposited in every hive. Since a whole hive is commonly **steadfast**[2] to the same flower species, pure types of honey that have a higher quality and bring a better price can be marketed.

By using methods of pollen analysis, Dr. **A. Maurizio** was able in Switzerland to identify more than 15 types of pure honey which steadfast bees had collected from definite flower species during a season.

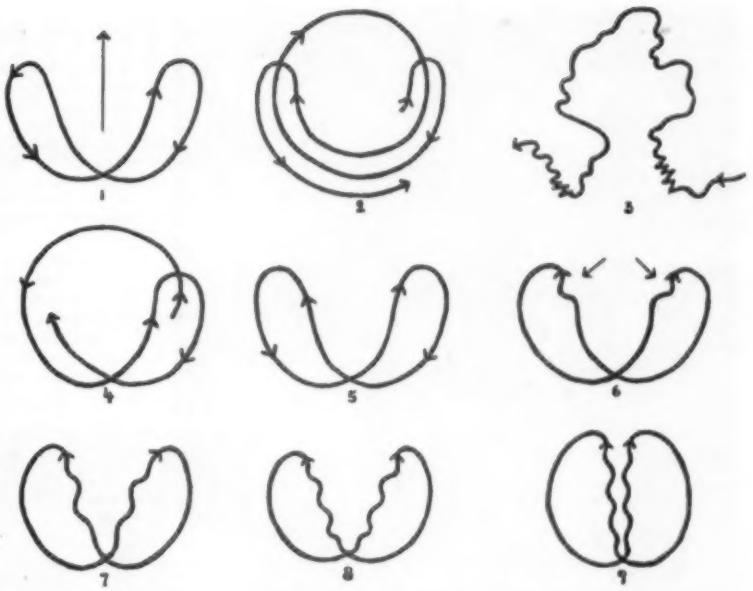


Fig. 4—1) sickle dance; 2) directed round dance (middle) according to F. Tschumi; 3) "rucktanz" according to Hein. 4-6—the development of a sickle dance from a round dance. 7-9—the development of a waggle dance from a sickle dance, according to Tschumi.

Melittolexis offers to the beekeeper many new opportunities. In several series of experiments Dr. K. von Frisch stimulated bees to perform the orientation dances and thus caused great masses of bees to visit the plants which the farmers wanted pollinated. The methods have been developed further in Russia and will be discussed in another paper.

The phenomenon of **"bees' struggle"** points to further opportunities.

The importance of apiculture is not restricted only to the production and marketing of honey. Many times more profit is derived from the bee's activity by the fruit and seed growers. Millions of additional colonies are necessary to insure the success of the soil conservation program. In our country, where the wild pollinators are declining more and more in numbers, neither horticulture nor agriculture would be profitable without the pollinating activity of bees.

The knowledge and practical application of melittolexis would enable the beekeeper to have the life and work of his bees entirely under his control.

Taking this into consideration, the outlook for the beekeeper should be somewhat brighter in the future. He needs more specialization and scientific training, but after he has it he is rewarded by a considerably greater income from a better quality of honey and gains further compensation from fruit growers and seed producers. A recent study of the writers on the formation of humus, points to the further importance of bees in preparing the parent material for the humus formation. This fact offers further oportunities for mutual cooperation and compensation between farmer and beekeeper.

References

The best reference book is that of K. von Frisch: **Bees,** Cornell University Press, 1950, which can be ordered from the **American Bee Journal** office at a postpaid price of $3.00. The newest research records are published in different scientific magazines in Europe which ordinarily are not accessible to American beekeepers. Some short articles about "Bees' Struggle" are published in the **Am. Bee Journal** (No. 11, 1951, p. 462); **Agricult. Chemicals** (No. 4, 1951, p. 48); and **Scient. American** (No. 2, 1951, p. 34).

Footnotes

The word **"language"** pertains to the tongue (lingua), which is the main organ used in human verbal speech. But insects do not use the tongue in their communication. The use of the anthropomorphic term "language" in the case of the communication of insects is therefore misleading and should be avoided. Dr. A. L. Kroeber (1952), discussing different viewpoints, concludes that "language" is not the appropriate term to express the way of communication of insects.

Dr. K. von Frisch uses in German the term "die Sprache", in quotation marks which has however a different origin and a more general meaning than our "language". "Sprechen" means "to speak" in general and does not pertain to the tongue.

2. **Steadfast** is recommended **by H. M. Biegen** to express the attitude of pollinating insects in visiting the flowers of only one type at a time and in not mixing the nectar or pollen of different plant species. It was believed formerly that bees are individually **constant** to some single or few species, which faithfulness of bees was called **"flower fidelity"** (J. H. Lovell, 1918). This viewpoint is not quite correct and steadfastness is in our case not a synonym for "constancy."

How to Make a Bee Beard . . .

Raymond Presnell, at the North Carolina State Beekeepers' Meeting, Appalachian Teachers' College, Boone, North Carolina, August 14, in the apiary of Mrs. A. A. Greene, staged a full grown bee beard making demonstration. Resident of Schull's Mills, Ray is one of North Carolina's beekeeping top-notchers. Most of the pictures were taken by Ralph Mills, photographer in the Visual Aids Department, of the North Carolina State College, at Raleigh. Photo 4 is from W. A. Stephen, Extension Beekeeper of the State College.

An advance copy from Life Magazine's "Nature Department," sent by D. Lyon Smith (Editorial Services), shows some pictures similar to these, for the September 22 issue of Life.

Let's follow Ray, and see how he grows a bee beard. No. 1, left, he shakes all the bees from a hive into a pasteboard box. The queen is captive in the cage hung around his throat, with the cage under the chin. In No. 2 (center, right), Ray gradually shakes the bees from the box onto his chest. In No. 3, center left, the bees crawl up to the caged queen. This is not a quick process and may be helped by gentle smoke and a soft brush. In No. 4, the bees are gathered well up around the mouth and ears, amid squawks and squeaks, shudders, and fear from the onlookers. Nothing to worry about, folks. Ray is about the "expertest" bee beard maker in the country and if there are any stings to come they will be his, not yours.

Finally, in the last picture (No. 5, bottom) Ray stands bedecked with live bees from head to foot (almost). Think you can do it? Our bet is that you won't do it the first time; only after several tries and not with an audience either.

The bees were than dislodged in front of the hive, brushed off, queen returned and they all ran in happily, like performing dogs, only no sugar; just home. Between us and in secret, Ray got seven stings. One was right under an eye. Ouch!

December Spotlight

Honeyhouse Equipment

Honey Houses, Equipment and Methods

by Dr. E. J. Dyce

Cornell University, Ithaca, New York

IN this discussion I have been asked to deal with honey houses, equipment and methods suitable for a beekeeper operating 500 or more colonies. In doing this an attempt will be made to include some basic principles which I hope will help the small as well as the very large beekeeper choose the equipment and methods which will most nearly meet his needs.

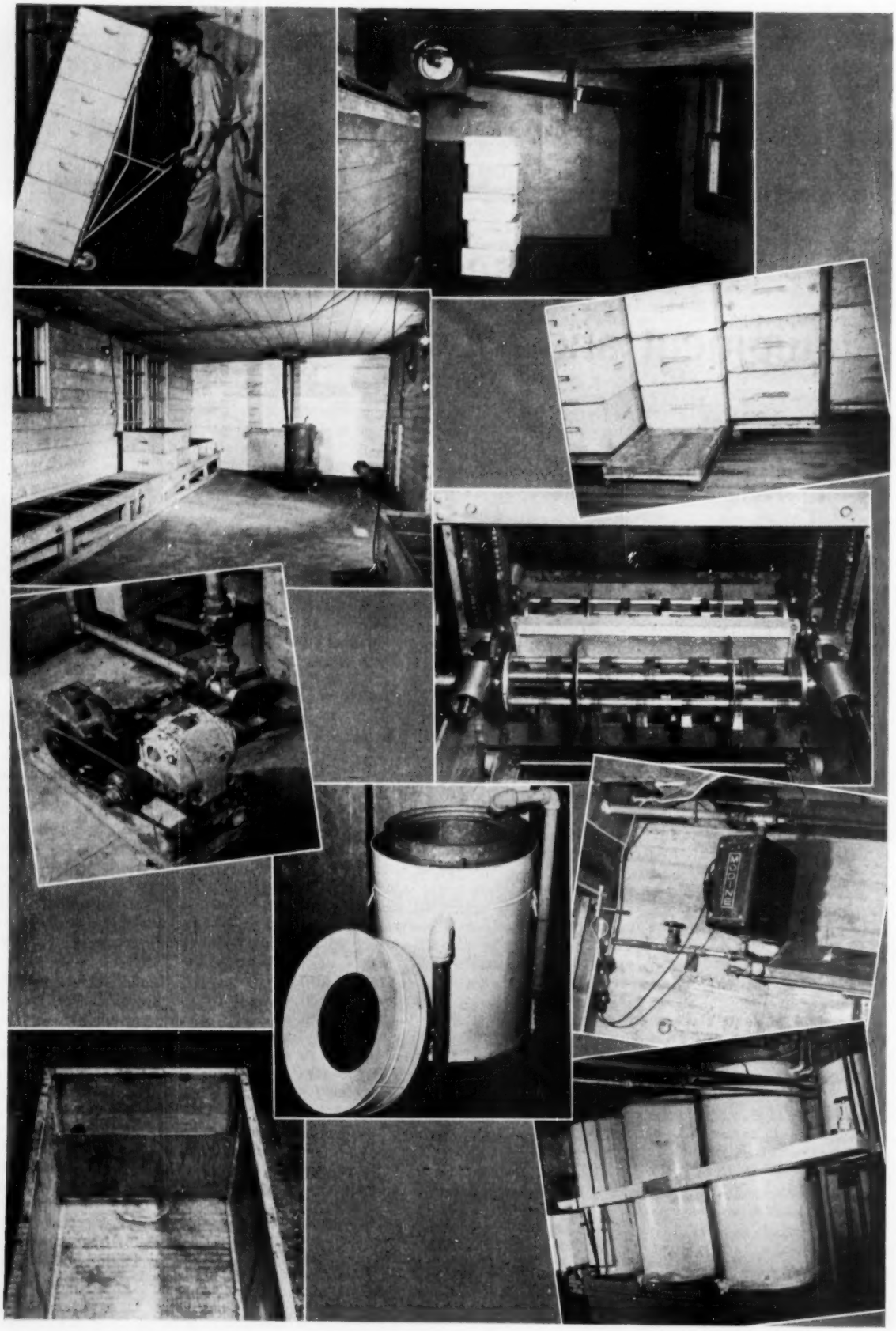
The design or type of honey house is influenced largely by the land available. In areas where the land is not flat they are often built on the side of a small hill and frequently consist of two floors with truck docks at both levels. A truck dock or platform which is level with the floor of the truck saves much time and effort in loading and unloading. It permits the use of hand trucks for handling both supers and honey containers. A two-story building is generally more economical to construct but it is often a greater fire hazard. There should be no objection to a single story building providing the floor is built high enough to permit truck docks, and providing a large sump is installed in the floor to permit the honey to run by gravity from the extractors and uncapping equipment.

It is very important to make honey houses as fireproof as possible. One economical plan is to lay a large concrete slab on a good foundation, construct the walls of cinder or concrete blocks and use a metal roof. Excellent coatings of different colors are now available which may be applied to cinder or cement blocks to make the walls both sanitary and attractive. The floors should be sloped enough for frequent washing and good drainage. Ample windows should be installed, especially in the uncapping and filling rooms and in the workshop, to provide abundance of light.

Honey houses should be located where there is plenty of good fresh water for all sanitary requirements and for fire protection. When installing the water system it is a good plan to include a shower for the help. Beekeeping is hot work in the summer and a shower is appreciated. It is one of many small ways of making it less difficult to secure regular summer help. Ample electricity at reasonable rates also should be taken into consideration in deciding upon a location. Most large honey houses have a low pressure boiler. The steam is used to heat the hot room, render the cappings and to provide hot water for cleaning the floors and equipment.

In two-story buildings it is generally more economical to use standard hardwood flooring for the surface of the upper floor. If a good water repellent coating is applied to these floors they are easy to clean and they will last almost indefinitely. After each washing the surplus water should be removed from the floors with a large dairy squeegee. This permits the floors to dry quickly. To remove bits of wax from the floor a good homemade tool can be made by using a disk from a disk harrow. A standard door hinge is fastened to a long handle and loosely attached to the convex side of the disk to permit it to turn. As the disk is pushed along the floor it removes the wax with a shearing action. It may be sharpened if necessary.

It is often more convenient to store all the supers in the honey house during the inactive season, but the danger of fire is too great. Even if the equipment is amply covered with fire insurance it would be almost impossible to prepare enough frames of foundation and supers for the next season if a fire occurred during winter. The trend in the North is to store the supers in the apiaries in small cheaply constructed buildings or in well-covered piles in the open. If mice are excluded and air is permitted to circulate through the supers, the combs will come



Titles to Pictures on Opposite Page . . .

(Top left). An efficient super truck built by A. L. Coggshall using a pair of large standard hard rubber tired casters, 2-inch width channel iron, and electrical conduit. For the money expended, super trucks have probably saved more time and effort for commercial beekeepers than any other single device used in honey houses during recent years.

(Top right). A good hot room in J. N. Dyment's honey house at Smithville, Ontario. The room is heated by a large steam radiator housed in a long, narrow, high box at the left side of the room. The lid at the top of the box is opened and closed by a thermostatically controlled motor. The large squirrel-cage fan attached to the ceiling, which is also thermostatically controlled, forces the warm air through large enclosed ducts across the ceiling and down the wall to the floor at the right side of the room. This method insures good temperature control as well as circulation of the warm air.

(Next to top, left). The hot room in C. M. Johnson's honey house at Niagara Falls, Ontario. It is simple in design, efficient in operation and can be modified to meet the needs of the average beekeeper. The room is insulated, the ceiling is low and the small heater provides ample heat. The supers of honey to be extracted are neatly piled 5 or 6 high along the entire length of the heating trough or elongated box. In the center of the trough is housed a large fan driven by an electric motor. This fan draws the warm air from the ceiling near the stove down through the supers piled on the right hand side of the trough and forces it up through the piles of supers on the left hand side of the trough. Troughs of this design may be constructed to accommodate a small or a large number of supers. If desired two or more troughs may be used in a room. These troughs are also capable of removing moisture from honey while in the comb. When removing moisture Mr. Johnson opens a port in the wall next to the ceiling to permit moist air to escape when the relative humidity gets too high. This opening is located above the supers through which the warm moist air is being exhausted.

(Next to top, right). Ventilated pallets used by R. W. Maguire in his honey house at Minesing, Ontario. These permit warm air to circulate between the combs while the honey is in the hot room.

(Center, left). A gear reducer used by A. L. Coggshall to reduce the speed of his honey pump. There are many types of good gear reducers on the market. Note the adjustable speed pulley on the motor shaft; with this pulley, pump speed is adjusted upward from a low of 22 r.p.m.

(Center, right). A Bogenschutz power uncapper in A. L. Coggshall's honey house near Ithaca, N. Y. The covers are removed to show the reels of cutting fingers for uncapping the combs. The combs are carried down between the reels on endless chains and are released at the bottom on another pair of chains which carry the combs to the end of the long uncapping tank. This machine was recently used to test different types of cutters.

(Next to bottom, left). An O.A.C. strainer used in Oscar Krouse's honey house. It is made up of four screen cylinders held in a vertical position in a round tank provided with a baffle. Each cylinder as well as the tank has a gate for draining and cleaning it. The cylinder in the center of the strainer is made with a screen having 12 meshes to the inch. As the honey runs into this cylinder the screen holds back the largest pieces of beeswax. The next largest screen has 30 meshes to the inch, the third 50 and the last and largest cylinder has 80 meshes to the inch. The three screens with the finest mesh are usually made of monel metal backed and supported with heavy one-quarter inch wire screening. Each screen is also topped with a circle of metal to provide additional gravity pressure. With this arrangement each screen progressively removes smaller particles. This greatly reduces the work placed on the 80-mesh screen and permits it to operate much longer than otherwise would be possible. A screen with the smallest openings is always the one that plugs first. This is why we purposely made the 80-mesh screen the largest in the O.A.C. strainer. The screens being submerged and held in a vertical position permit the wax particles to rise to the surface of the honey and this automatically helps to keep the screens from clogging prematurely. This strainer embodies most of the basic principles which should be considered in purchasing or making an efficient gravity honey strainer. The chief objection to the O.A.C. strainer is that it is inclined to plug prematurely if combs containing much crystallized honey are extracted. Furthermore, for best results the temperature of the honey should not be lower than 75° F.

(Next to bottom, right). A steam unit heater provided with a fan and a thermostat which A. L. Coggshall uses to maintain a temperature of at least 85° F. in his room for settling and straining honey. Note the thermostat, switch and fuse box (located from top to bottom) on the right side of the door way. Unit heaters are available in all types and sizes.

(Bottom, left). A large tank made into an efficient baffle tank. The baffle is removable and the overflow pipe beyond the baffle which controls the height of the honey in the tank may be removed to drain and clean the tank.

(Bottom, right). Oscar Krouse's clarification equipment in his honey house at Guelph, Ontario. After the honey is warmed in the hot room it is extracted in a 95-comb ferris-wheel type (Hodgson) extractor and runs by gravity into the small round baffle tank at the upper right hand side of the picture. From this baffle tank the honey flows by gravity over a long, narrow heating trough which is provided with a water jacket. This trough does an excellent job of warming the honey and has given many years of service. It is another piece of equipment which can be modified to meet the needs of the average beekeeper. The warmed honey from the heating trough then runs into a long, wide rectangular tank which acts as a combination strainer and baffle tank. The straining cloth is supported about 10" from the top of the tank on large inverted V-shaped pieces of perforated metal to increase the straining area. When the straining cloth begins to show signs of clogging it is picked up by the corners and hung up to drain. A new straining cloth is then spread over the tank. Since the cloth used on this strainer is not fine enough to remove the very small particles of wax the honey is then pumped to an O.A.C. strainer on the second floor to finish the job. The pump is operated by an automatic pump control. From the O.A.C. strainer the honey runs by gravity into the three large holding tanks in the center of the picture.

through the winter in good condition. Provision should be made to fumigate the supers for wax moth control.

Combs and supers needing repairs can be sorted out and retained in the honey house. It is also a good plan to sort out the drone combs, put a dab of bright colored paint on each top bar and place them in separate supers. This plan lessens the possibility of drone comb being accidentally used in the brood or food chambers. It also permits holding these supers in reserve in case of a large crop. If mice or moths should cause some damage to these combs the loss is not great. In the South many commercial beekeepers construct separate fire and moth-proof buildings in which to store combs. The buildings are made air-tight to permit economical, effective fumigation.

During recent years, owing to increased costs of building materials and labor, there has been a trend toward reducing the size of honey houses to an absolute minimum. There is a danger of putting too much money into a honey house in relation to the number of colonies operated. There is also a danger of building one too small. To arrive at a rough estimate of the amount of floor space needed, the following requirements should be considered. There should be sufficient room in case of rainy weather to keep the extraction equipment in operation for at least two or three days. The hot room for warming the supers before they are extracted should be large enough to hold enough combs to keep the extraction equipment busy for at least one day. If excessive moisture is a problem, a larger hot room should be used or provision made to heat the main storage room. The most convenient place for beekeepers to remove moisture from honey is while the honey is in the combs. There should be ample room provided for uncapping, extracting, clarifying and storing the crop in bulk containers. A good sized workshop is also important for repairing and assembling equipment during the winter. Workshops are normally located beside or above the heating units.

Let us now consider some facilities and methods in removing, extracting, and preparing the crop for market. When honey is removed from the colonies, the trend is to pile the supers on pallets on the truck. A pallet somewhat resembles a standard bottom board with the front of the board cut off to the dimensions of the supers and the back end of the board removed. Actually the outer dimensions of pallets should be about one-quarter of an inch less than the length and width of the supers. This prevents pallets from snagging when removing tight piles of supers from the truck or from storage. It is important to construct them in such a way that a maximum amount of warm air is permitted to circulate between the combs in the supers while they are in the hot room. These pallets and a truck dock at the honey house permit the use of a super truck to unload the honey.

Several beekeepers use hydraulic tail gates to help load the honey. They are very efficient but are rather expensive and heavy to carry around on the back end of a truck. A number of beekeepers simply

make a small excavation in the ground near the colonies in each apiary and back the hind wheels of the truck into the depression. This lowers the floor of the truck to a point where it is a simple matter to load the supers by hand with the aid of a wheelbarrow.

Many commercial beekeepers prefer to have a truck dock either inside the main structure of the honey house or in a bee-tight lean-to at the side of the building. Both methods keep robber bees from entering the supers and make it unnecessary to unload the truck when arriving at the honey house after dark or during a rainstorm.

Since the height of the truck floor may vary with the weight of the load some beekeepers have installed elaborate devices which automatically equalize truck and dock heights. Others simply jack up the back of the truck platform when the weight on the load is unusually heavy. Supers kept on pallets eliminate much handwork and cleaning floors, especially in the honey house.

Many commercial beekeepers, except in the extreme South, now use a hot room to warm the combs before they are extracted. This practice greatly facilitates uncapping, extracting, and clarifying the honey. In fact it is almost impossible to get along without a hot room in the North if a fall crop is harvested. To save steps, the hot room should be located between the truck dock and the extracting room. It is best to have the supers move in a circular or direct line through the honey house. To save fuel, the hot room should be thoroughly insulated. Some beekeepers even go so far as to cover the insulated walls and ceiling of their hot room with aluminum foil or aluminum paint, which reflects and further helps to conserve the heat.

Various equipment and methods are used to heat hot rooms. Steam or electric unit heaters provided with large fans are most commonly used. The best possible circulation of air should be provided, especially if removal of moisture from the honey is desired. Unfortunately standard unit heaters are not always efficient and it may be necessary to install baffles, ducts or extra fans to ensure adequate circulation of air. In a good hot room it is not difficult to remove from one to two per cent moisture from the honey in a period of 24 hours.

Uncapping the combs is still the greatest bottleneck in the honey house for the majority of commercial beekeepers. Various types of power uncappers have been developed, and in the hands of some beekeepers they are giving fair satisfaction. With most of them each comb must be fastened in a jig to keep it steady during the uncapping process. Considerable work is required to fasten the comb in a jig, pass it through the cutters, pull or lift it back again and remove it from the jig. Rather than go through these motions, many beekeepers feel that it is simpler to uncap the combs by hand.

At least two types of uncapping machines have been developed which have eliminated the need of fastening the combs in a jig. One type operates on the principle of feeding the combs through two heated vibrating knives on an endless belt which also carries the combs over to the extractors. In the other type the combs are carried down between two horizontal reels of revolving cutting fingers and are automatically released below onto two chains which carry the combs to the end of a long rectangular tank. Both types have their good and bad points, but the latter or cutting finger type of uncapper has enjoyed the greatest popularity. It handles Hoffman as well as most other types of self-spacing and free-hanging frames and permits cutting deep into the cell walls of the combs. This makes it unnecessary to remove cappings by hand from depressed areas in combs.

Power uncappers have greatly increased the speed of uncapping the combs, but the increased volume of honey extracted has also created a clarification problem in some honey houses. The beekeepers who experienced difficulty doubtless overlooked the necessity of gearing their warming, settling and straining equipment to the speed of the uncappers. Equipment designed to warm, settle and strain honey from one or two hand-operated knives is no longer adequate. At least one finger type power uncapper is capable of uncapping 1,000 or more pounds of honey an hour. It is not surprising that most honey houses are not equipped to clarify properly this large amount of honey. On the other hand, beekeepers who purchased a power uncapper and at the same time adequately enlarged their clarification equipment are not experiencing difficulty in preparing U. S. Grade A honey for market.

Power uncappers which remove the cappings with cutting fingers break them up and make it more difficult to remove the particles of wax from the honey. In an effort to increase the size of the cappings, different types of cutters were tested on a power uncapper (Bogenschutz) during the past season. The work was conducted in cooperation with the manufacturer of this machine and A. L. Coggshall at his honey house at North Lansing, N. Y. It was found that the speed at which the reels turned was far more important than the size and type of the cutters. In fact the narrow cutting fingers originally installed on the machine appeared to work much better than the wider types that were tested. The most efficient maintained speed of the reels appeared to be at or above 2,000 revolutions per minute. At reduced speeds of around 1,000 r.p.m. the cappings from the wider types of cutters were slightly larger but the cutters were inclined to bend over the edges of the cell walls. This made it more difficult to extract all the honey from the combs.

Clarification of the honey was also observed in Mr. Coggshall's honey house. The honey was first warmed in a hot room to about 85° F., uncapped in a Bogenschutz uncapper and run by gravity, together with the honey and cappings from the uncapping machine, through about 15 square feet of perforated metal with one-eighth inch holes to remove the bulk of the cappings. This screen was supported above the first sump or baffle tank. The honey was heated to about 115° F. as it was pumped from the first to the second baffle tank and then run through an O.A.C. strainer. The room in which the honey was settled and strained was maintained at a temperature of about 85° F. The equipment was operated at the rate of a little over 700 pounds of honey an hour; the moisture content of the honey averaged 18 per cent.

No serious difficulty was encountered and no visible particles were present in the final product. On the other hand, Mr. Coggshall was not entirely satisfied with his equipment. In the first place, he felt that a better method should be devised to remove the bulk of the cappings before the honey is heated. In the second place, he felt that the honey, after it is heated, should be run

Picture Titles . . .

(Top, right). E. A. Hogarth's two-story honey house at Tara, Ontario. It is one of the most economical and efficient honey houses for operating 2000 colonies in Ontario. Note the economical shed roof over the main building as well as over the enclosed truck dock. The roof is covered with black asphalt roofing which is an advantage during the extracting season in helping to keep the building warm. The enclosed truck dock is bee tight, making it unnecessary to unload the truck immediately.

(First, below). The truck dock on E. A. Hogarth's lower floor of his honey house. It is used mainly for loading bulk honey and beeswax.

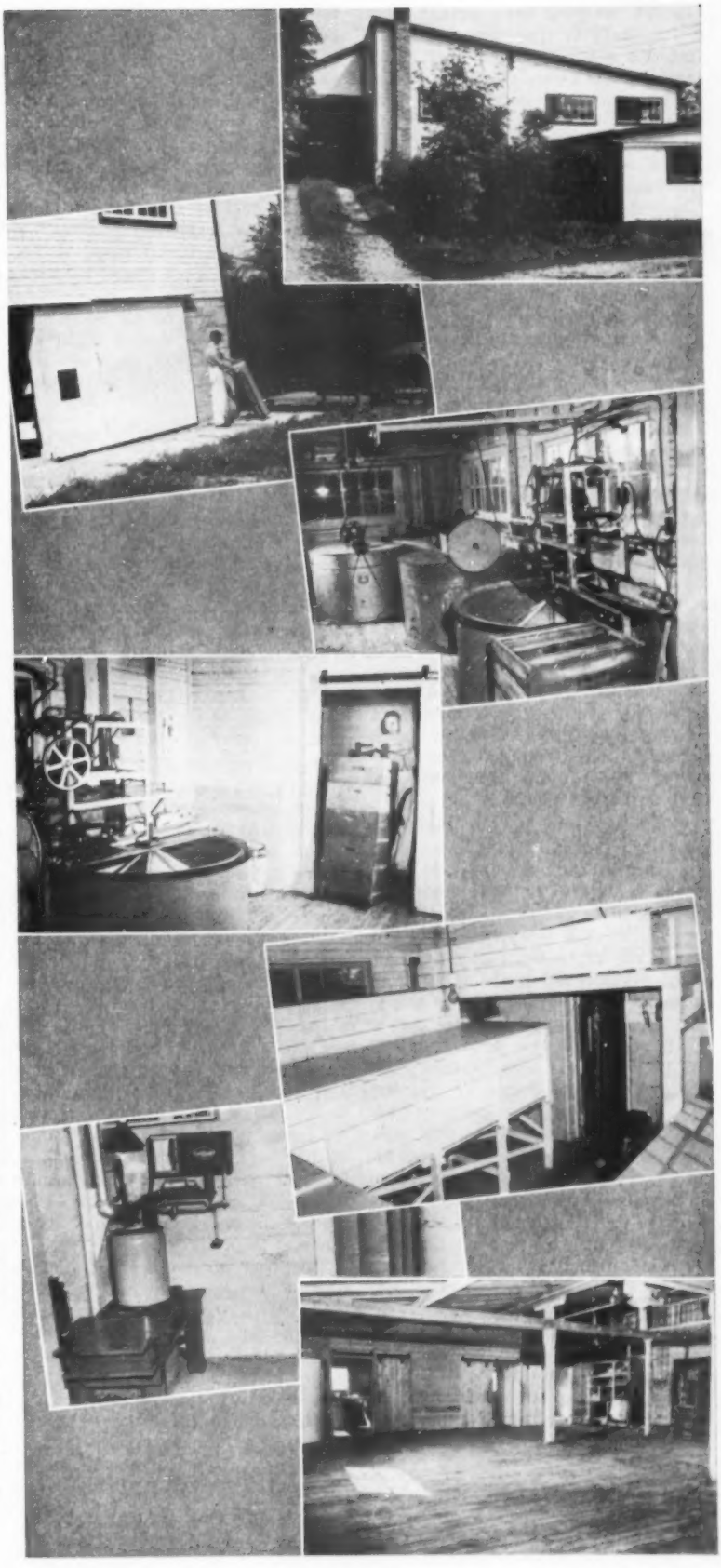
(Second, below). E. A. Hogarth's uncapping and extracting room. The combs are fed through a power uncapper on an endless belt which also carries them over to the extractors. As the cappings are removed by two heated vibrating knives they drop into a whirl-dry which is located directly under the uncapping machine. The whirl-dry is kept in motion during the time the uncapping machine is in operation. Note the space devoted to windows to provide abundance of light and the hardwood floors which are easy to keep clean.

(Third, below). E. A. Hogarth moving supers of honey from his hot room to his power uncapper in his extracting room. His super truck which is a modified bag truck makes the job easy.

(Fourth, below). The honey clarification room in E. A. Hogarth's honey house. The honey is heated to about 110° F. and flows from the upper central baffle tank into the one next to the window and then by gravity through three more long, wide baffle tanks housed in the same room. From the last baffle tank located near the floor, the honey is pumped to a large holding tank on the second floor. The pump is operated by an automatic pump control. The honey from this tank is then run into bulk containers on the lower floor. By using large baffle tanks and keeping the temperature of the room at around 90° F. he finds it unnecessary to strain the honey. The baffle tanks being well supported with wood are made of lighter gauge metal than would otherwise be needed. All the tanks are provided with lids to keep out dust particles.

(Next to bottom). E. A. Hogarth's arrangement on the lower floor of his honey house for filling bulk containers. Note the over and under weight scales; a profitable investment for any commercial beekeeper. Note also the level at which the containers are handled and filled. This arrangement saves much stooping. Many steel drums are used in Canada which hold up to 70 pounds of honey. They are coated on the inside to prevent the honey from reacting with the iron. These drums are sturdy and will normally last for several years.

(Bottom). The central storage room on the second floor of E. A. Hogarth's honey house. This room will hold enough supers in case of rainy weather to keep his extracting equipment in operation for several days. Note the simple construction of the roof and the steam unit heater attached to the ceiling, also the hardwood floors. At the right of the picture beyond the pallets is the main door and truck dock. During the process of extracting the supers travel in a circle from the truck dock back to the same dock. The supers of honey are first moved into the hot room through the center door in the picture. From the hot room they are gradually moved into the uncapping and extracting room through another door which connects the two rooms. After the combs are extracted they are brought out through the left door in the picture into the storage room and finally to the truck dock. At the left side of the picture is a large holding tank to which the honey is pumped from the last baffle tank.



through at least two baffle tanks with large surface areas. This would give the small particles of wax more time to rise to the surface of the honey and thereby reduce the work placed on the strainer.

Perhaps one of the simplest meth-

ods for removing the cappings from a Bogenschutz type uncapper is to install a large, well-supported metal screen a few inches from the bottom of the uncapping machine tank. This tank is provided with a baffle to permit continuous passage of the honey. At the end of the day when the tank is drained, the cappings accumulate on the screen and are allowed to drain overnight before being removed. The cappings may then be shoveled into boxes, perforated metal baskets or bins for further drainage, or they may be placed immediately in conventional equipment such as a whirl-dry, a capping press or a large Brand melter to remove the remaining honey.

During the past decade, radial extractors have gradually become standard equipment in practically every large honey house. The popular types are well built and have already given years of satisfactory service. Most commercial beekeepers have been using two 45- or 50-frame radial extractors. With the introduction of power uncappers at least three and preferably four large extractors are needed to keep up with the machine. It is surprising that more Ferris-wheel type of extractors developed by W. L. Hodgson have not been manufactured. They handle up to 96 combs and are very easy on them.

We have been in the habit of criticizing honey pumps. We now find that if they are in good condition and are properly operated there is little danger of incorporating air in the honey. Few honey pumps should be run faster than 40 or 50 revolutions to the minute. It is much better to use a large pump and run it slowly than to use a small pump and run it too fast. If the honey is not able to flow fast enough into the pump by gravity to keep it flooded, a vacuum will be created in the pump. When this happens small air bubbles are sucked through the glands or connections of the pump and become thoroughly churned into the honey. It is especially difficult to pump cold honey without putting some air into it. Pumps which are run at excessive speeds often incorporate so much air into the honey that it is impossible to remove all of it even in a vacuum pan. Such honey should never be used in a liquid honey pack as it usually crystallizes prematurely. There are several types of good gear reducers on the market. They are well worth the investment and no large honey house can afford to be without one.

Pipes leading to and from a pump should be at least as large in diameter as the openings in the pump. The inlet or suction pipe should be located as close as possible to the source of supply. Elbows, valves and other fittings in the pipe also create a great deal of friction and should be avoided whenever possible. To determine if a honey pump is running too fast, a tee should be placed in the inlet side of the pipe to permit the insertion of an inexpensive vacuum gauge. If even a slight vacuum shows on the gauge the inlet pipe should be enlarged or the speed of the pump reduced.

Pumps should never be connected directly to an extractor. It is almost impossible to watch them closely enough to prevent them running partially empty. When this happens much air is sucked in through the inlet pipe of the pump and is churned into the honey. This will also happen in pumping honey from a sump or any kind of a tank. A pump control is used to shut off the motor as soon as the honey is lowered to within a few inches of the inlet pipe leading to the pump. Pump controls are efficient and readily available at reasonable prices.

The honey from extractors as well as uncappers should be run first into a large unheated sump with a baffle to trap part of the wax. The honey is then warmed to about 100° F. as it flows by gravity or is pumped to the settling tanks provided with baffles. If most of the wax is removed and if the honey is heated slowly and uniformly, no significant heat damage will occur to the honey. A number of beekeepers warm honey by running it over an elongated Peterson melter or a long trough provided with a large water jacket below and throughout its entire length. The water jacket of any heating trough should be at least 4" deep and for best results the water in the jacket should be rapidly circulated with a small water pump.

The area of the heating surface of any unit heater should be much larger than the minimum required. This permits using water in the jacket which is not much higher in temperature than the honey running off the trough. It also reduces damage to the thin film of honey which clings to the hot surface of the heater. Troughs from 10' to 20' long and from 6" to 24" in width are occasionally used in honey houses. The heating surfaces of troughs are inclined to bulge just enough in the center to run the honey to the sides of the troughs and reduce their efficiency. To prevent this the heating surface should be strengthened or tied down in a few places to the base of the water jacket with small rods or strips of metal. If wide strips of metal forming baffles are installed in the water jacket to cause the water to flow in a zig-zag manner through the jacket they will keep the heating surface of the trough level, and at the same time improve the heating ability of the unit. Furthermore, if baffles are installed on the heating surface of units to cause the honey to flow from one side of the heater to the other, the efficiency of the units will be improved.

Honey is also warmed by pumping it through varying lengths of pipe immersed in hot water. Since honey is a poor conductor of heat it is always difficult to warm honey in the center of large pipes. Flash heaters which flatten out the honey and heat it in very thin layers are best. A few beekeepers warm honey by pumping it simultaneously through three 50-foot lengths of one-half inch pipe immersed in hot water. The honey is first pumped through a header or a four-way pipe-cross to which the three lengths of coiled pipe are attached. The honey then flows with equal pressure through the three pipes. These three coils may be intermeshed with each other in a 55-gallon drum used as a water bath. This arrangement supports and holds the coils in position and is economical of space.

To be effective, baffle tanks should be at least 8' long by 3' wide and 12" deep. The actual shape of a baffle tank is not important, but it is important to provide a large settling area to permit the wax particles to rise to the surface of the honey. For best results the depth of the honey in the tanks should not exceed eight inches. It is a good plan to use removable baffles as this facilitates cleaning the tanks. Before the honey is run into a baffle tank, the baffle plate is shoved down to the bottom of the tank. After a few inches of honey accumulates in the tank, the baffle is then raised about one-half inch and left in this position for operation.

To save floor space, baffle tanks may be supported on sturdy shelves one above the other. They should

be staggered just enough to permit the honey to flow by gravity from one tank to the other. Three baffle tanks may be mounted in a room with an 8' ceiling and still leave plenty of headroom between them for skimming and cleaning. One opening in the bottom at the very end of the tank, on the other side of the baffle, is all that is needed in each tank. A threaded flange is attached around the opening and a pipe about 8" long is screwed into the flange. This pipe, which should be at least 2" in diameter, controls the depth of the honey in the tank and permits the honey to flow through it from one tank to the other after it is baffled. To drain the tank the pipe is simply unscrewed from the flange and removed. If the tanks are supported on strong shelves it is not necessary to construct them of heavy metal. Baffle tanks of simple design are not too expensive and are a great factor in solving the clarification problem.

After the honey is baffled, it should be strained to make certain all the visible wax particles are removed. The amount of straining needed will depend almost entirely on the temperature of the honey and the number and size of the baffle tanks used. There are various types of homemade and manufactured strainers which are giving satisfactory service. It is always best to use a strainer which is larger than normally needed. The efficiency of any strainer depends on its straining area and the size of its largest opening. Wire strainers are preferable to cloth as the openings are not so likely to become stretched and enlarged. Cloth or wire which is immersed deep into the honey in a horizontal or vertical position are much more efficient than when honey is poured directly through them. When straining mediums are submerged, the wax particles tend to rise to the surface of the honey and prevent the openings in the strainers from being clogged prematurely. Most of the principles of efficient straining are included in the O.A.C. strainer, and homemade strainers can be constructed of cloth or wire to closely resemble them. The room in which the honey is settled and strained should be maintained at a temperature of at least 90° F.

After the honey is strained it may be run directly into bulk containers. If enough baffle tanks and a good strainer are used large storage tanks are not needed. When filling bulk containers most people are inclined to overfill them. To avoid inaccurate filling an over and under weight scale is a sound investment. In fact it will likely pay for itself in three or four years.

Recently there has been a definite increase in the use of 55-gallon steel drums to hold bulk honey. Most steel drums are now treated on the inside with a coating which does not freely react with honey. The drums are simple to fill and actually easy to handle in honey houses that are equipped with a drum truck and a loading dock. Five-gallon cans have become so expensive and so cheaply constructed it is not surprising that fewer of them are being used. In fact it is not uncommon to receive new 5-gallon cans which have already commenced to rust. The original cost of both types of containers per unit of weight are about the same. With reasonable care, drums will stand many more trips to market. The present life of the 60-pound can is two or three trips. Some commercial beekeepers and packers in Florida have installed excellent equipment for handling drums. Electrically operated hoists, which travel on "I" beams attached to the ceilings and supported out over the truck docks, permit picking up the drums and transporting them where desired.

Practically all equipment now manufactured for the food packing industry is made of stainless steel. It is one of the few metals which reacts less to the action of acids and salt. Unfortunately it is expensive and rather difficult to work. Some honey house equipment is already made of stainless steel but more should be used. Tinned copper, monel metal and aluminum do not appear to react very much with honey. We know that copper reacts with honey to some extent but recent preliminary experiments indicate that it may not be as harmful to honey as we have been led to believe. Honey removes galvanized coating and soon exposes the bare iron. Iron, of course, is the worst possible metal to come in contact with honey. Even a small rust spot on the inside of a 60-pound container will darken much of the honey in the can and give it a decided metallic flavor. Fortunately several good acid proof paints and lacquers have appeared on the market which do not noticeably react with honey. These are satisfactory for coating extractors and other honey house equipment.

Competition forces processors and packers constantly to seek new devices, equipment and methods which will permit them to turn out a better product at a lower cost. Whether we like it or not we are in the same competitive field and we must keep in step with the times.

Photos by R. A. Maurer, Department of Extension Teaching and Information, N. Y. S. College of Agriculture

Beekeeping Motion Pictures

We have had many inquiries about the availability of beekeeping motion pictures. In "Animal Sciences Films and Filmstrips" available from the Audio-Visual Center of the State College of Washington at Pullman, Washington, these films are listed. **City of Wax** showing kinds of bees, work done, treatment of bees strange to the hive, queen bee laying eggs, development of eggs, life cycle, at a rental fee of $1.75. **Honey Bee** showing the bees, their work, life cycle, activities and their services to man, rental $2.25. **Pollination of Alfalfa** showing how pollination takes place, insects involved, life and activity of the honey bee, how bees are used as pollinators and the management of them, rental price $2.25. **Story of the Bees** shows the life of the bee compared with that of a city, kinds of bees, value of bees to man, how nectar is obtained, uses of pollen, life cycle, rental $2.75. **Transferring Bees to Movable Frame Hives,** rental 50 cents.

Thrift and Hustle . . .

I am old-fashioned enough to believe that the way out of present economic difficulties is by the old time method of thrift and hustle. The propaganda to buy now is well placed if we buy what we need, but extravagance is what got us into our present mess, and it will take the opposite to get us out. We cannot make more by doing less. The wealth of the nation is measured in goods and if we destroy part of our products, we have less wealth. Money is only of value when exchanged for goods. I would prefer a big honey crop at a low price to a small one at a high price. There are still plenty of pancakes that lack the honey spread.

Frank C. Pellett
(A.B.J., page 412, October, 1933.)

Extracting Equipment for the Smaller Apiary

by Edwin J. Anderson

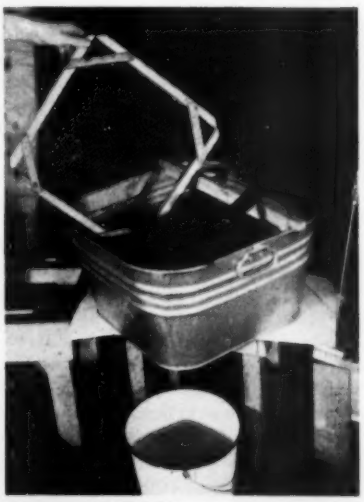
Professor, Pennsylvania State College

THE beginner and the backlot beekeeper often find themselves at a loss to know just what type of equipment to buy for extracting, straining, and bottling honey. Their final decisions and selection of equipment may mean the difference between success in their beekeeping enterprise and giving up in disgust.

I recall the experience of one young beekeeper who placed a 60-pound can of crystallized honey in the oven of his wife's electric stove. He and his family then went to the doctor's office where they waited until 5:30 to see the doctor. When through, they decided to eat their supper downtown because of the late hour, then see a movie, completely forgetting about the honey. They returned home about 11 P. M. to find the entire inside of the house coated with black soot. The walls, draperies, furniture and everything was black. All that was left of the 60-pound can of honey was a black cake about six inches thick.

Such experiences are not necessary if the beekeeper is properly equipped. Even the small beekeeper with a few colonies must have special equipment if he is to avoid annoying experiences and produce a fine quality of honey. The minimum amount of equipment required to do a satisfactory job of extracting, straining and bottling honey would be: (1) a honey uncapping knife, either electrically heated or plain, (2) a washtub for cappings, (3) another tub with a rack to hold uncapped combs, (4) an extractor, (5) and (6) a bottling tank with a strainer on top.

A large square galvanized washtub will hold the cappings of 1000 pounds of honey. To convert such a tub into a capping can, cut a one-inch hole in one corner of the bottom to permit the honey to drain into a bucket. Make a square wooden frame (No. 2) from strips of white pine ¾ inch thick by 1½ inches wide. The frame is made to fit against the four sides of the bottom of the tub. The corners of the frame are braced with strips of



(Below). The equipment needed by the side-line beekeeper. It includes (from left to right), electric uncapping knife and uncapping can, rack for frames and four-frame honey extractor. Bottling tank is missing.

(Top, right). The uncapping can with screen removed to show its construction.

(Bottom, right). Capping tub with nail on which to place frames and knife.

quarter inch thick lattice or similar strips. Three or four mesh hardware cloth is tacked to the top of the frame. The cappings fall on the screen as the combs are uncapped. If the cappings are stirred from time to time, more of the honey will drain from them. A two-inch thick piece of white pine is placed across the top of the tub. (No. 3) A nail is driven through the center of the strip so it extends about ¾ inch above one edge. This strip is attached or braced to the tub to prevent it from tipping over when a comb to be uncapped is placed on the nail.

The rack to hold the uncapped combs is shown in the photographs (Nos. 4 & 5) as are also the dimensions for the different pieces. The front or one side of the tub is cut out, leaving a 2-inch rim on the bottom. The rack will hold from ten to fourteen combs, depending upon the size of the tub. The honey that drains from the combs also passes through a hole in one corner of the bottom as does the honey from the capping tub.

The combs are extracted in a two- or four-frame reversible hand extractor or other small type of extractor. Each set of combs are reversed twice in the extractor. They are turned slowly or about 150 r.p.m. the first time and about 350 r.p.m. for the second and third runs. By turning the combs slowly the first time, very few combs will be broken from the weight of the honey on the inside of the midrib.

The most efficient type of straining and bottling tank is the flat box type with a straining cloth that covers the entire top of the tank. (No. 6) A galvanized iron tank 20 inches wide by 30 inches long by 13 inches deep will hold about 350 pounds of honey, or a tank 24 inches wide by 40 inches long by 14 inches deep will hold about 600 lbs. of honey. The tank in the photo was a small model tank without the bottle filler.

A honey gate is fastened into one end of this tank in such a way that the opening from the tank to the honey gate is level with the bottom of the tank. This arrangement is accomplished by boring the opening in the end of the tank even with the bottom, then soldering a heavy piece of galvanized angle iron below the opening and flush with the end of the tank. The angle iron is two inches long and ½ inch on each of the two sides. A union to receive the honey gate is soldered to both the end of the tank and to the small piece of angle iron. By keeping the inside of the union ⅛ inch below the bottom of the tank, all the honey drains from the honey tank when the bottles are filled. The attachment of the union to the tank is strengthened with a boss so the attachment does not break loose as the gate is used. The tank is enclosed in ¾ inch boards to make it stronger.

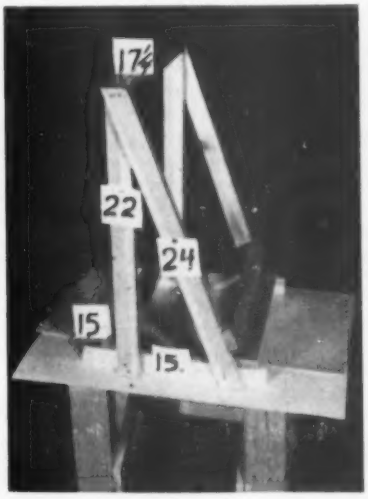
The strainer consists of a rectangular wooden frame in which is attached a wire screen basket made from 3 or 4 mesh hardware cloth. Make the wooden frame from 2½ inch strips of ¾ inch white pine. The outside dimensions of the completed frame are ½ inch less than the inside dimensions of the tank. The wire basket is made 4½ inches deep and of such a size that it fits tightly inside the frame. The basket is nailed to the inside top of the frame. Thin strips of wood are nailed over the top of edges of the screen so the wire does not catch and tear the cheesecloth. Two pieces of 2-inch white pine are cut 2½ inches longer than the ends of the wooden frame. These pieces are nailed to the outside top of both ends of the frame, holding the strainer in place on top of the bottling tank. Two or three layers of cheesecloth are placed in the strainer and the honey poured through the cloth and left to drain into the tank. Honey should be extracted when warm or above 80 degrees F. if possible. Cold honey is almost impossible to strain or it drains through a cloth very slowly. The strained honey is bottled as soon as convenient after it is strained.

Extracted honey will normally crystallize soon after it is bottled. Crysallization may be prevented by placing the bottles of honey in hot water and heating the honey to 145 degrees F. A large pan may be used for this purpose. Cut a piece of hardware cloth the same size as the inside bottom of the pan and place it in the pan. The bottles of honey are placed on the screen and warm water is poured into the pan until it rises to within one inch of the top of the bottles.

It is important to leave an air space of ⅜ to ½ inch in the top of the bottles when they are filled with

The rack for uncapped combs and the tub in which it is placed showing the cut out.

The rack for the uncapped combs with dimensions for the separate pieces.



A tank with a three-mesh basket on top covered with three layers of cheesecloth. Bottle filler has not been added. It is to be placed on the end.

cold honey. This space allows the honey to expand as it is heated without running out from under the cap. It is not necessary to remove the caps from the bottles as they are heated. The temperature of the honey is checked occasionally in one of the bottles with a thermometer to prevent overheating and burning. The honey is removed immediately from the hot water when the temperature reaches 145 degrees. If the honey should crystallize in the bottles, it is heated in the same way as indicated above to bring it back to the liquid form. If honey is overheated it turns red, darkens and takes on a burnt flavor. Honey should never be stored in a damp basement or damp room as it will absorb moisture and ferment. A dry room with a temperature of about 75 degrees F. is an ideal place to store honey. The cappings that are obtained may be rendered most efficiently in a solar wax extractor.

The expense of the equipment described above is not very great. This equipment does permit the beekeeper to bottle and place on the market an excellent grade of honey and the extracting and bottling is done with a minimum amount of labor.

Honey Handling for the Medium Sized Beekeeper

by Roy A. Grout

IN THE previous Spotlight article, Dr. Dyce has written comprehensively of the problems, fundamentals and methods of extracting especially for the beekeeper with 500 colonies or more. Dr. Anderson has done a similar thing for the beginner or backlot beekeeper, as he prefers to designate the small-sized beekeeper. But in between these two size classifications is a large group of honey producers and this article is directed to them.

These honey producers keep as many colonies as their circumstances or desires dictate. They are seriously engaged in the production of honey as an added source of income. Beekeeping is not their sole occupation nor is it a hobby or avocation. Because of this, these people may use methods and equipment that approximate, on a smaller scale, those described by Dr. Dyce. On the other hand, if their time is not limited, they need only to use an improved version of the methods and equipment described by Dr. Anderson. Thus, time and convenience usually will dictate whether less expensive and simple equipment should be used, or whether more efficient and elaborate equipment is needed to extract the honey faster.

When the honey in the combs is warm and the temperature of the extracting room is high, a four-frame extractor is capable of removing 1,000 pounds of honey each day when operated by one man. In one of the Dadant apiaries, with four men working under ideal conditions, 5,500 pounds of honey was removed from the colonies and extracted in a single ten-hour day with a nonreversible, four-frame, basket-type extractor turned by hand. It should be readily understood, therefore, that most

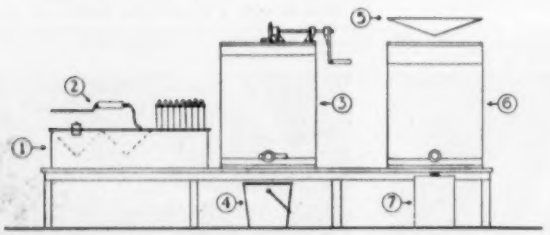


Diagram 1. (above) This extracting outfit will handle either a little honey or a big crop if the honey is warm and time and convenience is not an important factor.

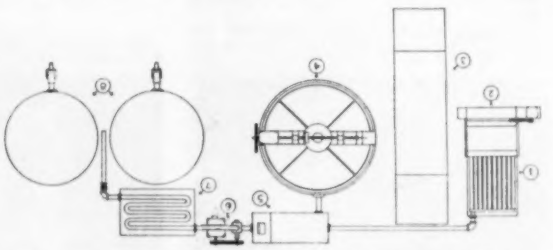
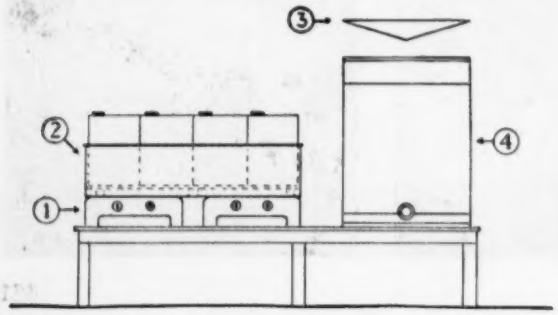
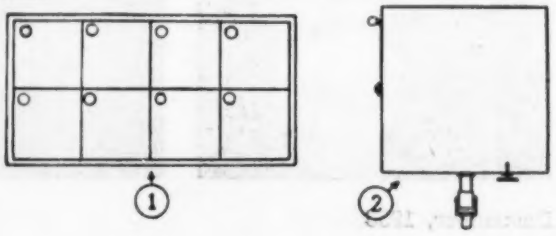


Diagram 2. (lower left) This small liquefying and bottling outfit makes use of two pieces of equipment used in extracting (see Diagram 1).

Diagram 3. (above) For extracting 7,500 pounds of honey or more—for the operator with 100 to 300 colonies—the above diagrammed extracting setup is fast and efficient.

Diagram 4. (below) A medium-sized liquefying and bottling outfit.





people in this classification of honey producers use equipment larger than necessary but they do so because of their need or desire to extract honey faster and with greater convenience.

In Diagram 1, is shown an extracting set-up which is capable of handling a lot of honey for those who have ample time and are willing or perhaps capable of the extra labor involved. It consists of an uncapping tank and comb rack (1) of a type available in two sizes, (2) an electric uncapping knife although a steam knife can be used if a small steam boiler is included, (3) a small extractor which will hold four large or eight small combs turned by hand but can be motor driven with the minor changes and additions, (4) a bucket for transferring the honey to the strainer (5) and the storage tank (6), where it is drawn into bulk containers (7) after settling.

The same uncapping tank and comb rack can be used for liquefying four 60-pound cans of honey (see Diagram 2). The tank with water around the cans which are kept off the bottom, by a slatted wood frame, can be heated by stoves (1) of various types. When the honey has reached the desired temperature (145° F. for 30 minutes to prevent fermentation or 160° F. for the same length of time to prevent granulation), it is ready to strain through an 86-mesh cloth and into the same storage tank for bottling [(3) and (4), respectively in Diagram 2.] The honey should be drawn into retail containers as soon as possible and set apart for cooling as quickly as can be done.

In Diagram 3, is shown extracting equipment suitable for the larger honey producer in this classification or for those who desire to get the work done more quickly and efficiently. There are, of course, many modifications of such an extracting set-up. Perhaps the one diagrammed should be considered somewhat on the elaborate side.

This outfit consists of (1) a Junior Brand cappings melter which melts the cappings and separates the honey from the beeswax during the day's operation, (2) a power, steam-heated uncapping knife although many will prefer to use a hand knife heated either electrically or with steam, (3) a tank for a comb rack which is available in several sizes, (4) a 30-frame radial extractor, (5) an automatic honey pump and strainer tank which removes coarse particles and prevents operation of the pump except when an adequate supply of honey is present thus preventing incorporation of air, (6) the honey pump which pumps the honey to a height where it flows by gravity through a baffled heating and clarifying tank or through a flash heater (7), and then through strainers into the two storage tanks (8) where it later is drawn into bulk storage containers.

Two honey storage tanks are shown because it is desirable to have one tank settling while the other one is being filled. The honey should never fall from a height directly into the storage tank, for this will incorporate tiny air bubbles in the honey which are difficult to remove. This can be avoided by having the honey run down an inclined plane, fall on to a float, or by introducing honey toward the bottom of the tank in some manner.

For liquefying and packing honey on a somewhat larger scale, we have shown in Diagram 4 an eight-can liquefying tank (1) and a honey packer tank which is available in either a 50- or a 100-gallon size. The honey should be strained into the tank, allowed to settle until clear, drawn into containers while hot and sealed, and set apart for quick cooling. A gooseneck filler is ideal for filling glass jars.

In packaging honey in this manner, it is well not to have the 60-pound cans filled with more than 50 to 55 pounds of honey. This makes the cans easier to handle and pour, and eliminates some loss of honey due to expansion when heating to liquefy. In handling the cans, always place one hand underneath since the wire handles are not fastened too securely. When stacking cans of honey in storage do not pile them too high or the cans will be damaged, and place strips of wood or celotex between each layer of cans. Honey in bulk containers should be stored in a dry place of even temperature or the cans may rust badly.

Planning the Honey Exhibit

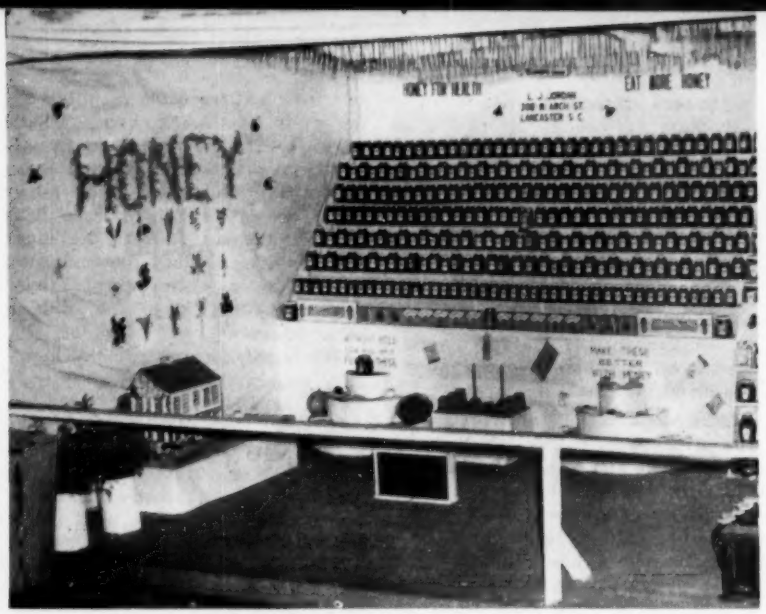
by L. J. Jordan

IN planning the honey exhibit one of the first things to be considered is "Why have an exhibit?" Maybe you want a little inexpensive advertising. If so, you have an excellent opportunity of accomplishing that result. Maybe you want to prove to your friendly competitors and the public that you have a better product than they have. There is a certain amount of self-satisfaction that comes with winning and maybe you would like to win.

In writing this article about honey exhibits I am obliged to make some reference to Mrs. Jordan who has been the spark plug in our fair planning. It is Mrs. Jordan who helps originate the ideas we execute, and it is she who puts the finishing touches to each jar of honey shown.

Mrs. Jordan and I have visited many honey exhibits at state and county fairs in the southern states. In our visits to these fairs we often pick up a few ideas which may not have been previously used in our territory, and if we can incorporate them into our exhibits the public who views them may also obtain some benefit.

In using these various ideas we have adopted certain basic principles that must be observed if we are to win first prize. And winning first prize is the paramount objective in showing. One of the first things to consider is to start early in planning the exhibits. It is difficult to wait until the last minute and then expect to do all that should be done to include every idea for making



Jordan's winning exhibit at the South Carolina State Fair, 1952, at Columbia.

your exhibit the best in the fair. As soon as we have concluded our showing at a fair we begin to make plans for the next year. This plan may be revised a number of times during the year but we contrive to make each revision a little better.

The exhibit should have a central theme. We try to build around this idea. It must be educational as well as interesting. One of the prime objects in having a fair is to promote the improvement of the products of the community in which the fair is held. The exhibit should teach a definite lesson. How many exhibits have you seen that failed to impress you? On the other hand you may remember some which caused you to stop and linger until you had observed every feature of the exhibit.

To catch the eye of the passing visitor one needs some attractive feature. It need not have any relationship to honey, but should cause the visitor to stop and see what you are showing. It might be a doll house, miniature bee yard, toy electric train, display of beekeeping equipment, or live bees. In nearly all honey exhibits of any consequence live bees are shown. They usually attract the attention of children who inform their parents about them.

Foremost in the arrangement of the exhibit, is HONEY. Not only should the honey be shown in all its color and beauty, but the visitor must be made to feel that he would like to have some of it to eat. It must be inviting.

It is desirable to have color, motion, and lighting. Colors which contrast without clashing are appealing to the eye and help to beautify the honey. They help to make the honey stand out. Which color to use will depend upon the color of honey shown. A light amber honey will absorb some colors and reflect others. Dark honeys will absorb other colors and reflect some. Various colors need to be demonstrated on your honey to see which show up best.

Anything in motion attracts attention. Some exhibitors have discovered this fact and use turntables to get attention to their honey. Toy electric trains loaded with honey are very attractive. Ferris wheels make honey show up well.

Modern advertisers have found that lighting works wonders with the public which views their displays. Honey is one object that yields readily to improved appearance by lighting. The light rays may be con-

Winning exhibit at the Lancaster Fair in 1949.

Another at the State Fair, Columbia, 1951.

verged directly on the jars or they may be placed behind the jars to show through the honey.

One of the fine features of any exhibit is the demonstration that goes with it. That is one idea we have not developed to perfection yet. It has lots of possibilities. One might show extracting, packing, cooking, or using honey.

One of the greatest assets to any exhibit is the labeling that goes with it. One never, or almost never, puts too much information on his exhibit. Once I saw an excellent exhibit fail to win the highest prize because the objects shown lacked identification. You as a beekeeper may know perfectly everything you show, but the average visitor to your exhibit may not know the difference between an extractor and an excluder. Put labels on the objects you show. It takes a little time and effort, but isn't it worth it? Labels are a real necessity on exploded objects. Once I saw all parts of a beehive separated with no labels on any of them. Another time I saw perfect pictures of bees without stating which was queen, worker or drone. To the visitor all looked like overgrown flies.

To present an object lesson we think it is important to emphasize some phase of the beekeeping industry. One year it may be production, another packing, one may be pollination, another marketing or utilization. These help to educate the public and create an interest in honey, which is what we honey producers would like to stress anyway.

However, the main thing to be considered is HONEY. What are you showing? What are you trying to get across to the public? And how will you impress the judges? We have learned from experience that to win first prize we must do all those things previously mentioned and then produce a quality honey. It must be true to its color, beauty, fragrance and bouquet. The consistency must be right. The viscosity must show a perfect honey bubble. The honey must be entirely free of impurities of every kind, including visible signs of granulation. Even tiny bubbles prevent the honey from appearing perfect.

Exhibiting at a fair is beneficial to the exhibitor. He learns if his product is better or of lower quality than his friend's and often determines why the difference. You may win a prize and it may be first prize. In this case you can advertise that fact. Even if you don't win a prize the advertising benefit is immeasurable. Many people have bought honey because it was shown at a fair. South Carolina

Editorials - - -

Seasons Best Greetings To All

The staff of the American Bee Journal welcomes this opportunity to wish each and everyone of its readers A VERY MERRY CHRISTMAS and A HAPPY AND PROSPEROUS 1954! We hope Santa fills your stocking well and that your Holidays find your family coming home for a merry, rollicking good time.

Especially at Christmas, we wish you much happiness and good cheer! For the New Year, we wish you health, happiness and prosperity throughout the entire year!

The holiday season, moreover, reminds us that another year has come and gone. It reminds us of the many friends we have met or corresponded with during the past twelve months. It reminds us of the many helpful things so many people have done to make the American Bee Journal what it has been. For these things we are humbly grateful.

We are brought to face in this manner with our continuing responsibilities for the year, 1954. So we again promise our readers that we will renew our efforts to make every issue during the coming year more interesting, informative and useful to you; and that we will earnestly endeavor to be worthy of your continued interest and help by continuing to do our part to make beekeeping a worthwhile and pleasureable undertaking.

Baltimore Awaits You - Plan To Attend

In this issue you will find more information about the annual meeting of the American Beekeeping Federation at Baltimore, Maryland.

As usual, many other groups and organizations within the bee and honey industry will hold their meetings at the same time and place. These meetings are important to each and every individual associated in any way with bees and honey; they deserve your support by attending and participating in them.

For many years the national meeting has not been held in the East. There is a real reason and a need for holding these annual meetings in various parts of this great country of ours. Last year's meeting was on the West Coast; it was a long way to go for those in the East and even in the Central West. This year the Midwest and the Far West will have a long trip to make. While it may be a long way for you to go, it will be worth your while to find some way to get there. It is not a question of whether you can afford the trip but whether you can afford not to attend.

At the Baltimore meeting, many decisions will be made which will have a serious and important bearing on the future of the industry—on your future and mine. Such matters as industry organization, the support program, Government stabilization aids, research, sanitation, and honey promotion and marketing will be thoroughly aired. Where do you stand on these issues? Clear thinking of leaders will be needed to meet these issues successfully. This requires representation from all parts of the country; it requires as many from the industry being there as possible.

We urge you to attend the Baltimore meeting. We urge you to be there and take an active part in deliberations. It offers you the opportunity of doing your part to improve conditions, to have an enjoyable trip, and to associate with the best group of people on earth in fun, fellowship, and constructive endeavor.

Forward View

Price support for honey is mandatory for another year. Whether we have a continuance beyond that nobody knows. Let's get ready to carry on by ourselves. Many beekeepers are now discouraged by crop shortages. Drought has put many out of business. Perhaps replacements that come when balance is restored will make up a more stable group. Those who have kept to the ranks for fifty years or more can tell you that the problems of the past have been as tough as any of the present, but in the long run, beekeeping is a good occupation.

MEETINGS

Federation—Baltimore—Jan. 25-30

By George J. Abrams, Apiculturist
University of Maryland,
College Park, Maryland

When Henry A. Schaefer, President of the American Beekeeping Federation, taps his gavel the morning of January 27, 1954 in the Lord Baltimore Hotel, Baltimore, he will open the first National Beekeepers Convention ever held east of the Alleghenys. And it will be the first national beekeepers conclave held in the "near east" since before the war. Not since the days of the moving picture and radio has a beekeepers convention been held in the East. Convention hungry Eastcoast beemen cannot say **this** time that the convention is too far away.

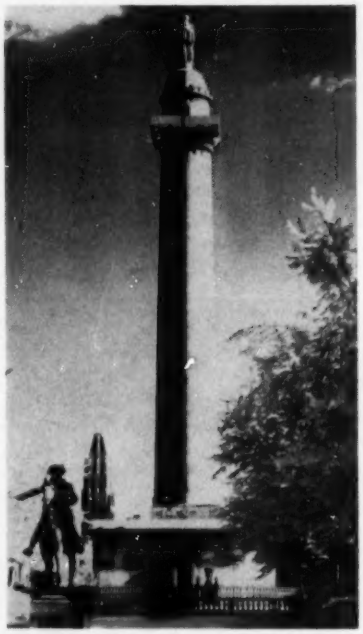
We expect it to be historic. Maryland beekeepers, the happy hosts, are in a dither over the event and are leaving no stone unturned to do the things that a host should do.

Meetings of the various committees and sections both before and after the convention program, will give almost a week for worthwhile deliberations and decisions, dating the entire meeting from Jan. 25 to Jan. 30.

A three-day convention gives ample time for a first-rate program of talks, reports and discussions, without complete exhaustion. We believe a highly intelligent program is being put together by Mr. Newman I. Lyle and his associates on the Program Committee. The program will be announced shortly in its entirety by Mr. Lyle. Suffice it to say at the present time that every segment and strata in the world of bee culture is being considered in building the Federation program so that all interests will be served and represented.

A sneak preview of the program reveals a fine **bee disease** section with the country's leading authorities discussing Nosema, American and European foulbrood. The latest work on **bee breeding** will be presented, as will the outstanding work being done on **honey research.** The **State extension specialists** will discuss their important work of disseminating up-to-date bee culture information to 4-H Clubs, F.F.A. and adult groups. (This will be a panel type of discussion with full, open meeting, from-the-floor audience participation encouraged.) **Pollination** and the **effects of insecticides** will receive the attention it so justly deserves. (A panel type of discussion, handled by leaders in the field —it too, will encourage audience participation.) No first-rate program could possibly omit **honey marketing** and **publicity.** These two important subjects will occupy prominent places on the program as will the **U.S.D.A. programs** for moving honey.

WASHINGTON MONUMENT



First monument to the memory of George Washington, Father of his country. An enduring landmark and a never-ending source of interest to visitors to the community as well as to Baltimoreans.

Of special interest to beginner or amateur beekeepers will be an entire afternoon devoted solely to problems of greatest concern to the small beekeepers. Authorities will discuss **Wintering, Swarm Control, Chunk and Comb Honey Production, Marketing for Small Beekeepers, History of American Beekeeping,** and **Bee Stings and Allergies.**

Every associated and allied organization aiding and abetting the beekeeping industry will have its place on the program and an opportunity to tell the beekeepers of the nation what it is doing to promote bee culture. Reports and recommendations from the following groups will be of tremendous interest and value: The American Honey Institute; The Honey Industry Council; The Southern States Beekeeping Federation; The Bee Industries Association; The National Honey Packers and Dealers Association; and the Apiary Inspectors of America.

Now, in America at least, a convention isn't a convention unless there are exhibits, displays, and entertainment. These we will have. The merry (and we mean merry) Maryland beekeepers are going to see to that. The Welcoming Committee assisted by University of Maryland Beauty Queens will meet you at the door and lend assistance with Registration and Introductions. The Entertainment Committee has engaged high quality entertainment for the Banquet and will arrange tours to interesting and historic Baltimore places. The Exhibit Committee will erect an exhibit worthy of the beekeeping industry and will handle the displays of Commercial exhibitors. The Sweepstakes Committee will handle a feature that should prove interesting. A word of explanation —each year in Maryland, after the County Fairs and the State Fair are history, the prize winning entries are brought together at a gilt edge show called the Maryland Honey Sweepstakes ($500 in premiums). Usually this Sweepstakes is held the first week in January at the Annual meeting of the Maryland State Beekeepers' Association. However, this year this event will be delayed until the Federation Convention so as to add interest to the convention's lobby sideshow.

Minnesota Beekeepers Assoc.
Minneapolis, December 5

The annual meeting of the Minnesota Beekeepers Association will be held on December 5 starting at 9:30 a.m. sharp at the Curtiss Hotel in Minneapolis. A good program is planned as well as a group luncheon at noon and a banquet in the evening.

A hearing will be held on the proposed honey grades for Minnesota at 10:00 a.m. in the State Office Building in St. Paul.

A tour through the University Farm Extracting plant and Bee Disease Laboratory is tentatively planned for the afternoon of December 4.

Come one and all and **bring your friends!**

Robert Banker, Secretary

Montana State Beekeepers Assoc.
32nd Annual Meeting
Billings, December 4-5

The annual meeting of the Montana State Beekeepers Association will be held at Billings at the Northern Hotel on December 4 and 5. The opening session will be at 10 A. M. on the 4th.

There will be a report from the delegate attending the national meeting of the American Beekeeping Federation at San Jose, Calif. There will also be a report from the Montana Citizens Freight Rate Association. Howard Foster, member of the Executive Committee of the Federation will speak on the need for closer cooperation between state association and the national association for the benefit of all beekeepers. There will be other interesting topics discussed.

Mrs. O. R. Burdett, Sec'y

Oakland County Beekeepers Assoc.
Rochester, Mich., Dec. 7

Anyone interested in spending a pleasant evening with his fellow beekeepers is invited to attend our meeting held at the Pontiac Township hall at the corner of Pontiac and Opdyke roads at 8 p.m. Meet your Michigan Honey Queen, Lois Linske. Refreshments will be served.

Al Bzenko, Pres.

Louisiana Annual
Baton Rouge, December 8

The Louisiana Beekeepers Association will hold its annual meeting in the Capitol Building, Baton Rouge, La., on December 8. Everyone is invited. Let's make this the best attended meeting we have ever had.

Otis Mitchell, President

Middlesex County Beekeepers Assoc.
December 12

Middlesex County Beekeepers Association (Mass.) will hold its December meeting 2 weeks earlier than usual on December 12, 1953, so as not to interfere with the "Holiday" season. The meeting will be proceeded at 6:30 P. M. with a buffet dinner, followed by a short business meeting and then the Christmas party. Some lucky member will be given a turkey for his Christmas dinner.

John H. Furber, Sec'y.

Michigan Meetings

Saturday, December 12 — Annual Association business meeting. Room 33 Union Building, Michigan State College, East Lansing, beginning 10:00 a.m.

Wednesday, February 3 and Thursday, February 4, 1954—Annual Farmers' Week Meeting. Room 103, 104 Kellogg Center, Michigan State College.

This is always an interesting meeting. Dr. W. E. Dunham of Ohio State University will be one of several interesting speaker. All beekeepers are welcome.

E. C. Martin,
Program Chairman

Western Missouri Beekeepers Assoc.
Kansas City, December 13

The Western Missouri Beekeeper's Association will meet at 7011 Prospect, Kansas City, Mo., on Sunday, December 13 at 2:30 p.m. Visitors are welcome.

Mrs. R. W. Cornforth, Sec'y

Colorado Beekeepers Assoc.
Denver, Dec. 14-15

The Colorado Beekeepers Association will hold their annual meeting at the Auditorium Hotel in Denver on December 14 and 15.

Eugene H. Wadleigh

Westchester Co. Beekeepers Assoc.
New Rochelle, N. Y., Dec. 20

The Westchester County Beekeepers' Association will hold its next meeting at 2:30 p.m., Sunday, Dec. 20 at the Odd Fellows Hall, 20 Lockwood Ave., New Rochelle, N. Y. At this time we will have our Christmas party. Come and have a pleasant time with your beekeeper friends.

Carlton E. Slater, Publicity

INSECT POLLINATION—

(Continued from page 469)

It will be noted that the number of seed produced by each floret or pod varied from none to as many as seven. The highest number of florets found in any one head was 135, while the average number was 84.4. It will be seen from a study of the table that the greatest number of florets produced three seed each. The greatest number of seed produced by one head was 318 while the smallest number was 72. The average seed production per head was 215.6.

Vansell,[1] working at Davis, California, on Ladino clover showed that the number of florets per head averaged about 100 and the average seed production per head was 247.6. His data also showed that most florets produced three seed each.

Discussion:

The reason for the wide divergence in average number of seed per head (89.87 in 1950 as compared with 215.6 seed per head in 1951) remains unexplained.

Likewise, other variables such as are suggested by Table 2 remain to excite the curiosity of a thoughtful person. Some of these are:

1. Variation in number of florets per head.
   Is this due to normal variation in this plant species or would better soil or better plant environment produce more florets per head and, therefore more seed per acre?
2. Variation in number of seed per floret.
   Again, is this due to normal variation or would more pollinizers per acre plus better growing conditions for the plant ensure a greater number of seed per floret.

The best we know at present is that plenty of bees per acre usually means a good seed crop. In discussing the matter with agronomists, the writer has gained the impression that this may be the result of bees reaching more of the florets rather than production of more seed per floret. Investigations under way by the writer at the South Carolina Experiment Station may eventually give the answers to these and some other questions regarding pollination and seed production of Ladino clover on which at present our information is incomplete.

1. Vansell, Geo. H.: Honeybee Activity on Ladino Clover Florets. Jo. Econ. Ent. 44: 103, February, 1951.

Crop and Market

By M. G. Dadant

Movements of Honey

With practically no exceptions reporters are advising that honey is moving, although not briskly at least at a fair rate and that the consumers are absorbing a good percentage of honey in spite of the warm weather which has but lately turned.

Undoubtedly the movement of honey is at least as good as it has been in any of the recent years and of course there is not sufficient time to report on the amount of activity which has been engendered by the activity of "Honey Week" and of P.M.A. efforts in that respect.

Prices

As usual there is considerable range in prices, with prices being highest generally in the East, tapering off in the Central West and prairie states, lowest in the intermountain and then advancing on the Pacific Coast. In general prices will range for a 1 lb. jar at about 30 to 35 cents, 5 lb. pails from $1.75 in the East to as low as $1.00 in the intermountain sections. We learn of a case in Michigan where a "special" has been made in stores of honey at 89 cents per 5 lb. pail.

Cut comb prices have held up quite nicely, with 69 cents for 2 lb. jars and about $1.75 to $1.95 for 5 lbs.

On the whole, however, there has not been any appreciable advance in price over last year even though there has been a stiffening in the cost of honey in bulk.

Offerings in Bulk

Here we come to perhaps the greatest variation. Many are still suggesting a price which is about equal to the support price. In fact much honey has moved at these prices, we believe, particularly in the intermountain and northern plains and plain sections. It may apply as well to Arizona and California.

Also many producers who are unacquainted with the present condition of the market are willing, or at least satisfied, to offer and sell at support prices even in the eastern and central western areas.

On the whole, however, there is a decided stiffening of the market and we believe we would be correct in saying that the average price asked for honey will be about 12 to 12½ cents for white with some honey being sold as high as 14 cents in the central and eastern areas. We learn of one large producer who is holding his entire crop for a 14 cent price and may be able to get it if the reported shortage of honey after the holidays materializes.

With amber honey, prices are ranging about 10 cents to 10½ cents per pound with one buyer reporting he is unable to buy honey in the Kansas-Nebraska area at 11 cents for amber. On the whole this shows a decided stimulation of wholesale prices on bulk honey engendered perhaps by the fact that some packers do not feel themselves too well fortified with honey stocks for the late winter and spring season.

Bulk comb honey is about a thing of the past on account of the extremely short supply. We learn of some bulk in frames in the Southeast selling as low as 17½ cents a pound but the average price, particularly in the Central South and up through the Missouri Valley, is about 20 cents per pound F.O.B. shipping point, frames and supers to be returned of course.

Will Honey Move?

All in all, our reporters are almost unanimous in stating that honey will all move ahead of the new crop and many are reporting that there is going to be a shortage. This is particularly true in sections where the crop was short as, for instance, New York and New England and the Southwest. Some buyers have stocked heavily anticipating such a shortage while others will be hurrying to find enough honey to fill their wants. We do notice one thing which we would criticize and that is that producers in the East if they run short are not anticipating much replenishing their supplies so as to keep customers supplied throughout the spring season. This has always been one of the drawbacks of the small packer or producer packer in that it does not mean a steady supply which we should have to compete with other sweets.

Canada

In Canada as is already known, the eastern provinces had a rather short crop, the central provinces a fair to good crop, and British Columbia and the Peace River Valley at least average. We learn of one producers group with some 2,000 colonies of bees in Peace River area reporting an average of 120 pounds for 1953 in spite of the fact that everything except the bottom hive body had to be drawn out from bee comb foundation. Probably another virgin territory which will soon be stocked to the limit.

Canadian prices have held nicely and in fact are advancing. We would suggest that probably their jobbing price is from one cent to three cents above our domestic price and there is some indication that there has been an effort to import United States honey into Canada or at least to get quotations from some of our United States producers.

Summary

All in all, the crop is small compared to a year ago, the demand steady and possibilities of a complete sellout more than satisfactory, with likelihood of shortages developing in supply.

A FINE BEE BOOK—

(Continued from page 469)

the bees become that they arrived just in time for breakfast, lunch, or tea and never at any other time. When preserves were discontinued for lunch, the bees soon perceived it and stopped coming, but would come around occasionally to see whether the Forels might not have gotten a fresh jar for the table, however, coming only at meal times.

This review becomes long, and still we have given no idea of the makeup of the book, by chapters. The first 67 pages "The Roots of Behavior" lay the foundation for the more detailed sections to come. The second part has to do with "Individual Behavior in the Field," the third with "Communication between Honeybees," and the fourth with "Life within the Community." It would take too long to review all 38 chapters, but their titles are attractive as is the content. Such titles as How Bees Find their Way Home, Drifting, Crop Constancy, Mating Behavior, Selection of a Home, Recognition of Comrades, Clustering, Wax Production, Temperature Regulation, are typical of the subjects chosen.

We consider this book a "MUST" for every scientist, experimenter, and educator, and a happy and valuable selection for all interested in the honeybee.

The American Bee Journal is carrying this book in stock for the convenience of its readers. A delightful gift for anyone. The price is $4.50 postpaid.

Some Aspects of Nectar Secretion . . .

Investigation of the composition of nectar from the nectary of flowers has not been followed hitherto because of the small amounts of nectar available but with the development of micro-analytical technique of paper partition chromatography for qualitative analysis of sugar mixtures, it has become possible to identify and separate the sugars in small volumes. Dr. Gwenyth R. Wykes, of the Rothamsted Experimental Station in England, has studied variations of the sugar composition of the nectar in relation to the collection of nectar by honey bees and hopes soon to publish her experimental work. (Reported by Dr. Tennent, Scotland.)

The Market Place . . .

BEES AND QUEENS

THREE BANDED Italian bees and queens —Best of quality. Also Dadant's 4-way hybrids. Real honey getters and very gentle. Write for 1954 prices. Alamance Bee Company, Graham, N. C. Phone 4703.

10-FRAME single story colonies of bees with young laying queens delivered loaded on your conveyance at our place. Write for particulars. P. M. Williams, Castleberry, Ala.

YELLOW ITALIAN BEES—Real producers. Health certificate. Satisfaction guaranteed. Queens, $1.00 Airmail. O. E. Brown, Rt. 1, Asheboro, North Carolina.

YANCEY HUSTLERS — Three-band Italians. They get the honey. Queens balance of season, $1.00; $10.00 dozen. Caney Valley Apiaries, Bay City, Texas.

FOR SALE

DUE TO MY ILLNESS I am compelled to sell my bee equipment consisting of over 1000 10-frame deep supers with frames, comb honey and shallow supers. New frames, observation hives, 4-frame Woodman power extractor, storage tank, queen excluders, metal covers, bottom boards, etc. All equipment has been boiled in lye water. Some supers used only one season. Chester A. Holmes, Rt. No. 1, Box 66, Wheaton, Ill.

FOR SALE—Complete set of Gleanings in Bee Culture, 1875-1950. Lacks only 6 volumes. $100. Francis Higgins, Gallaudet College, Washington 2, D. C.

FOR SALE—16,000 colonies complete with all equipment, fleet of trucks, branch warehouses, etc., located in western and middle western states. Woodrow Miller, Colton, Calif.

HOLLY-LINN APIARIES, Dayton, Texas —Well established business, good record of honey production. 950 standard 10-fr. clean colonies. Best southern locations. Modern extracting and packing plant. Large storage area. Mrs. Tyra Fulton, Trinity, Texas.

500 COLONIES BEES — 2-story, mostly tens. No disease. All or part, $10.00 each. Heavy with honey. H. Peterman, 551 No. Windsor Ave., Stockton, Calif.

100 COLONIES — 3 shallow supers each. Good North Georgia sourwood locations. Electric extractor and uncapping machine. Selling because of failing health. Box J. M., c/ American Bee Journal.

FOR SALE—Complete 600 colony outfit in Northern Alberta in clover seed growing district. Wonderful spring build-up area with continuous clover and fireweed honey flow until autumn frost. Land, buildings and all extracting equipment included. Also 1952 two-ton truck, if desired. Write Box 39, c/o American Bee Journal.

FOR SALE — New electro-flo filling machines. Model SA100—$365.00. Model SA200 — $285.00. F.o.b. Hancock Honey House, Hancock, Iowa.

HONEY and BEESWAX WANTED

HONEY WANTED—Large quantities. All grades. Cash price. Send samples. Finger Lakes Honey Coop., Groton, N. Y.

SMARTWEED HONEY WANTED — Also water white honey. Rocke Apiaries, Eureka, Ill.

WANTED—Honey, amber or light, in any amount. Send sample for prices. Holland Honey Cake Co., Holland, Mich.

HONEY WANTED — White and amber grades. Truck and car lots. Cash on delivery. Submit samples if possible. John Tideswell, 2711 No. 63rd St., Omaha, Nebr.

HONEY WANTED, in 60's, all grades. Send samples, advise quantity and best price. A. I. Root Co. of Syracuse, 1112-14 East Erie Blvd., Syracuse 3, N. Y.

HONEY WANTED—All grades and varieties. Highest cash prices paid. Mail samples. State quantity. HAMILTON & COMPANY, 2613 South Yates Ave., Los Angeles 22, Calif.

WANTED — Water white clover honey, truck or car lots; also light amber. Mail sample and lowest cash price. Write Stoller Honey Farms, Latty, Ohio.

BEESWAX AND HONEY WANTED in trade for supplies or cash. Hodgson Bee Supplies Ltd., 565—13th Ave., New Westminster, B. C., Canada.

WANTED — Amber or off-grade honeys. Give price and thorough description. R. Griggs, Hancock, Iowa.

WANTED — Extracted honey, white or light amber, in 60's. State price in first letter. Ed. Heldt, 1004 W. Washington St., Bloomington, Illinois.

WANTED to buy new crop honey in all grades. Highest cash prices. Submit samples. Schultz Honey Farms, Ripon, Wisconsin.

WANTED — Chunk comb and extracted honey. Victor Honey Farms, Rockwall, Texas.

WRITE FOR SHIPPING TAGS and current quotations on rendered beeswax. Any amount from one pound up bought. If you have 25 pounds or more, save 25% by letting us work it into foundation for you. Walter T. Kelley Co., Clarkson, Kentucky.

CASH PAID for white and amber extracted honey. Send samples and state quantity available. Prairie View Honey Co., 12303 Twelfth St., Detroit 6, Mich.

WANTED—Extra white and light amber honey. Let us ship you the containers. Sell us your honey for CASH on delivery. The Hubbard Apiaries, Manufacturers of Bee Supplies and Comb Foundation, Onsted, Michigan.

HONEY FOR SALE

Professor Luerssen's superior white clover honey. Also excellent fall honey. New cans. Priced right. 1301 E. Washington, Bloomington, Ill.

CLOVER, mixflower poplar extracted honey. Ralph Gamber, 910 State, Lancaster, Pennsylvania.

CLOVER HONEY — White extracted, 17c per lb. in sixties; 5 or more 60's at 16c. Heated and strained, 18c in sixties, 17c 5 or more. Lose Brothers, 206 E. Jefferson St., Louisville, Ky.

SUPPLIES

AUTOMATIC ELECTRIC HEATERS, notions. Prices just right. Devilbiss, Church Road, Va.

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Electro Filling Machines, users and distributors. Write Stoller Honey Farms, Latty, Ohio.

THE BIGGEST BEE SUPPLY CATALOGUE PUBLISHED (64 pages) free for the asking. Big factory manufacturing a complete line of wooden goods, comb foundation, metal goods, veils and gloves, carloads in stock, daily shipments, save 20%. WALTER T. KELLEY CO., CLARKSON, KENTUCKY.

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THE ONLY COMB FOUNDATION PLANT in the East. We sell foundation, work your wax, render combs and cappings. Robinson's Wax Works, Rt. No. 3, Auburn, New York.

POSITIONS AND HELP WANTED

WANTED—Experienced beekeeper for 1954 season or permanent position. Apartment included. J. Farr, 4851 Paddock Road, Bond Hill, Cincinnati, Ohio.

WANTED—Reliable man to operate outfit of bees on share basis. Box K, c/o American Bee Journal.

HELP WANTED—Experienced man preferred. Good position for right party. Give references. Howard Weaver, Navasota, Texas.

WANTED

WANTED — Extractor and 10-frame hive bodies. Must be clean. John Hemry, Lyons, Kansas.

WISH TO RENT 300-500 colonies bees, with option to buy. Merlin Grant, Spring Grove, Minn.

WANTED—650 zinc excluders. Also Bradshaw capping press. Ray Tomlin, Tarkio, Mo.

WILL PAY CASH for bee equipment with or without bees. No junk. Prefer white honey location. Box 24, c/o American Bee Journal.

SOUTH DAKOTA BEEKEEPER would like to buy 100 10-frame hive bodies of drawn combs. Box 33, c/o American Bee Journal.

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HONEY PLANTS, trees, shrubs, perennials. Unusual varieties most desirable for planting and make honey. New 1954 catalogue—actual photo illustrations. Send for your free copy today. Pellett Gardens, Atlantic, Iowa.

Plant new NECTAR AND POLLEN plants, shrubs, trees. Illustrated catalogue of 80 varieties. Nicollet County Nursery, St. Peter, Minn.

MISCELLANEOUS

FOR SALE—Blue, white and black shouldered peafowl, $25.00 pair. Extra peacocks. John Hemry, Lyons, Kansas.

BOOKBINDING—Bind your "Journal" in rich brown cloth. $2.25 per volume. E. Bradford, Westminster, Colo.

SECTION COMB HONEY production procedure steps — 50c. Glossary of Beekeeping Terms—50c. United Industries, Dept. K, Box 449, Madison 1, Wis.

RANCH MAGAZINE—Do you find it difficult to secure information about sheep and sheep ranching methods? The SHEEP AND GOAT RAISER reaches more sheepmen with more information of range sheep than any magazine published. Subscription $1.00. Hotel Cactus, San Angelo, Texas.

KNOW interesting facts concerning the bees of India through the INDIAN BEE JOURNAL, published in English, by the Bhupen Apiaries (Himalayas), Ramgarh, Dist. Nainital, U.P., India, and obtainable from them. Subs. Rs. 7/-or 10 Shillings or $2.25 per annum. Single copy Rs. ¼-s. 1/9 or 49 cents (international money order). Payment in mint postage stamps of your country accepted.

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